Marketing fluid milk in Montana
by Ralph Waldo Clark

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

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In the summer of 1951 a house-to-house survey was conducted in the 1950 sample areas to obtain information on milk consumption, income, and consumer likes and dislikes.

Significant determinations of the study includes: 1. Milk consumption in Montana is below the national average.

The average per capita milk consumption of the United States is one pint per day while the average per capita milk consumption for Montana is 0.9 pint per day.

2. Income,' size and age of family were the only factors, of those considered, found to have any effect on the variations in milk consumption. They explain about 36.5 per cent of the variations found in Montana’s milk consumption.

3. Fifty-eight and nine-tenths per cent of the families interviewed did not believe the paper containers worth one cent more than the glass bottle. Fifty-eight and eight-tenths per cent preferred to buy milk at the store when the price was the same as home delivery.

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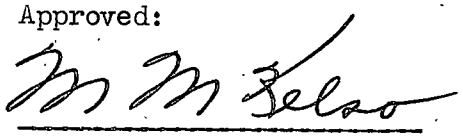
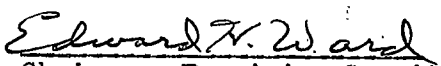
Approved:



Head, Major Department



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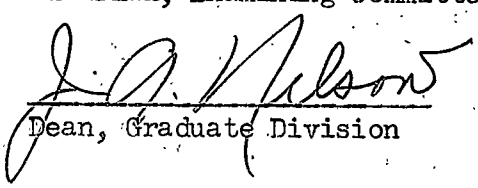

Dean, Graduate Division

Bozeman, Montana
June, 1952

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ABSTRACT

In the summer of 1950, all milk distributors in cities of 1,000 population and over, were interviewed to determine the per capita milk consumption in the respective cities. Interviews were also taken in a representative sample of towns under 1,000 population to determine the average per capita milk consumption of such towns. Information was also gathered on prices, transportation, and sales of milk.

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4. Transportation of milk has increased tremendously since 1947 in all parts of the state.

ACKNOWLEDGMENTS

The author wishes to express his thanks and appreciation to the staff and employees of the Agricultural Economics Department for their assistance and counsel in preparing this thesis. All were very helpful with suggestions and criticism throughout the study.

Appreciation and thanks are also due to the members of the Dairy Industry Department staff of Montana State College, for their assistance in preparing schedules and for valuable suggestions throughout the project.

Preface

An economist in his role as an impartial investigator must keep in mind his two-fold duties. First and primarily he has a duty to perform for society. If the research is financed by public funds, he should be especially aware of this obligation. Second, he has a duty to perform for that institution or institutions which he is seeking to help or enlighten. The goal of an economist should be to seek problem solutions which will benefit not only the institution, but society as well.

With these duties in mind, the Agricultural Economics Department of Montana State College has undertaken this study of Montana's Milk Industry. The milk industry is that part of dairying which concerns itself with the production, processing, and distribution of licensed whole milk for human consumption. In this phase of the study we have concentrated our attention more on the problems of processing and distribution.

General Objectives

This research project is the third in a series of studies being made of the Montana Milk Industry. The first study, conducted by Dr. G. E. Korzan, dealt with the costs of distributing milk; 1/ the second by Mr. H. C. Holje, dealt with marketing milk in Montana. 2/

This study has four main objectives:

1. The first objective is to obtain a clear overall view of the milk industry, and to observe certain changes taking place in the industry, e.g., the gradual elimination of the small producer-

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1/Korzan, G. E., Cost of Distributing Milk in Montana Markets.
2/Holje, H. C., Marketing Milk in Montana, M.S. Thesis, Montana State College, 1950.

distributor, the growth of large distributors, and the rapid expansion of transportation facilities.

2. The computation of the per capita milk consumption of all cities and towns of 1,000 population or more, and the average per capita consumption of villages and towns under 1,000 population. By the use of statistical methods we will try to determine those factors which are important in milk consumption in Montana.

3. The formulation of hypotheses designed to help the milk industry solve some of its problems without a detrimental effect on society.

4. As much of this research will be of a descriptive nature, suggestions for future research that is needed in the field of milk marketing in Montana will be discussed.

PART ONE

Introductory

CHAPTER I

INTRODUCTION

Description of Montana's Milk Industry

The milk industry consists of those producers and distributors that supply consumers with whole milk. The number of distributors, 3/ in the Montana milk industry has not decreased, but the number of producer-distributors has rapidly declined over the last several years. At the present, there are fifty-six distributors and thirty-four producer-distributors licensed by the State of Montana to engage in the processing and distribution of milk. 4/ The number of producers engaged in producing licensed milk varies greatly from year to year, although the trend in the last few years has been toward a reduction in numbers.

The market areas are constantly changing with the trend toward larger distribution areas. This will be discussed later in the chapter.

If one wished to roughly classify the production and distribution of milk in Montana by areas, the four classes that lend themselves most

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3/A "Distributor" is one who buys milk from the producer, processes and bottles the milk and delivers it to the customer.

4/Klemme, A. A., Letter to Mr. E. H. Ward, Assistant Professor of Agricultural Economics, Montana State College.

readily are:

1. Surplus area
2. Shortage area
3. Alternately surplus-shortage area
4. Self-sufficient area

There are two large surplus areas in the state at the present time. They are the Gallatin Valley and the Bitterroot-Flathead area (Figure I). There are numerous small surplus areas not shown in the figure. There are seven large shortage areas in the state of which the southeast section is the largest. The shapes and sizes of these areas are changing constantly, and the boundries are only approximate. There are three large areas that appear to be producing sufficient milk for local consumption and no more.

The alternately surplus-shortage areas are not shown because of their relatively small size and changing characteristics. With respect to milk consumption the shortage areas and alternately surplus-shortage areas have appeared to be below the state average. Generally the supply to the consumer and distributor is uncertain. This uncertainty of supply has had three main detrimental effects on milk consumption in these areas.

1. It has retarded the growth and development of the local distributor. In some cases it has forced the distributor to liquidate; leaving the community without a dependable source of milk.

2. The uncertainty of supply has been responsible in many cases

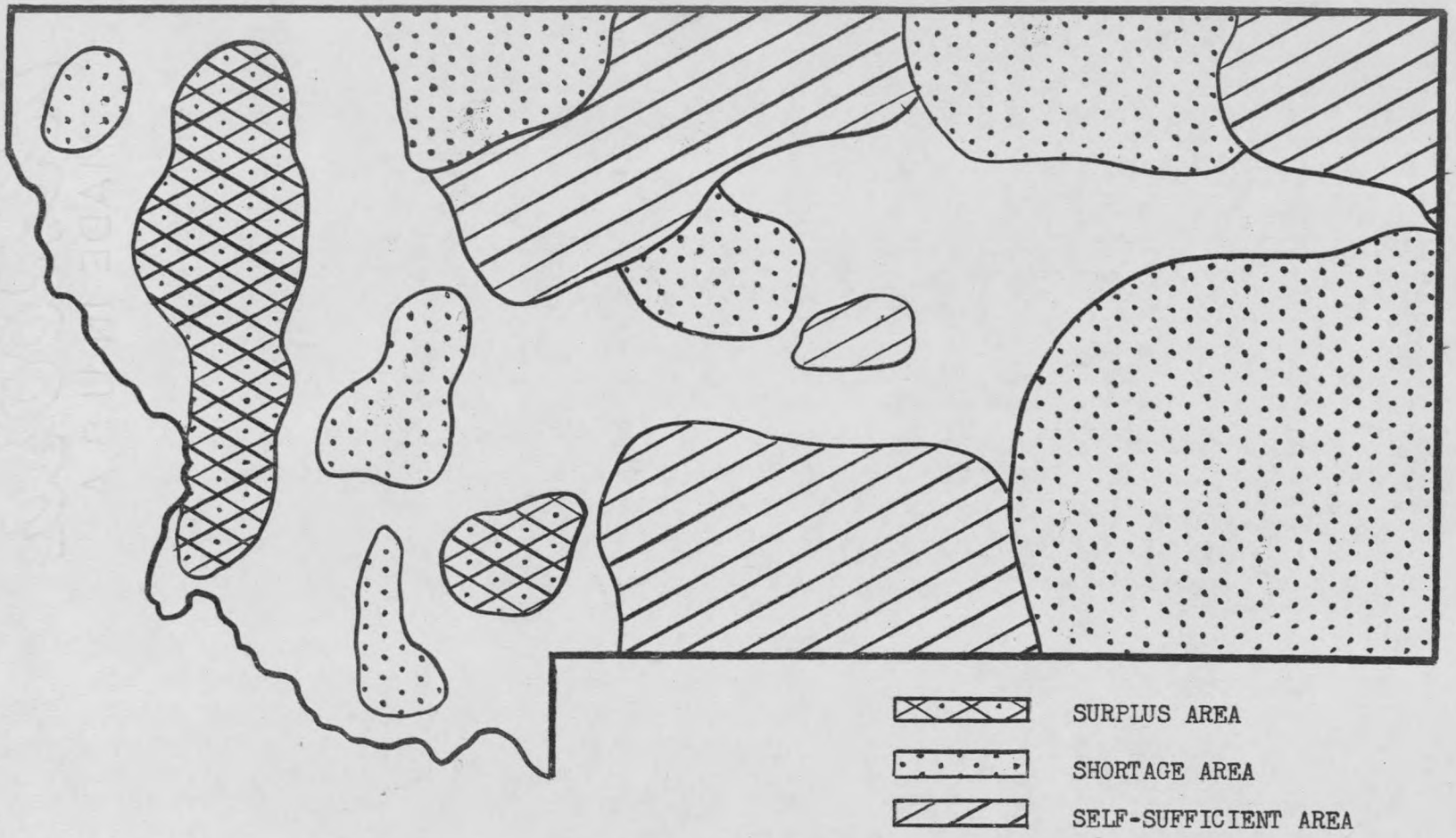

FIGURE 1. LOCATION OF MAJOR MILK SURPLUS, SHORTAGE, AND SELF-SUFFICIENT AREAS IN MONTANA. (1950)

for poor quality milk. Distributors were dependent on the local supply and in many cases this locally produced milk was of inferior quality.

3. At times people have been faced with shortages of milk and turn to substitutes such as condensed milk, eggs, and meat. The overall effect on milk consumption has been to lower the per capita milk consumption in these "surplus and shortage" areas.

A surplus-shortage area is usually an area where milk production is very seasonal, with high production in the spring and summer and low production in the fall and winter.

Milk Consumption in Montana is Below the National Average

Although Montana is a surplus milk producing state 5/ with large exports of dairy products, the per capita consumption of milk in Montana is below the national average. 6/ In certain areas of the state the per capita consumption of milk is very low.

Areas Unsuited for Economical Milk Production

At the present time many small areas in Montana where milk is being produced are unsuited for economical milk production. Most of these areas are located in eastern Montana and utilize dryland pasture. This dryland pasture is generally weedy, and unless great care is taken in the management of the herd, the milk produced on this pasture will have a weedy flavor defect. With the recent advances in the field of transportation and processing the barrier of distance that protected these

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5/Montana Agricultural Statistics, Volume III, December, 1950.
6/See Chapter V.

small areas has declined. These dryland dairies must now compete with dairies located on irrigated land where irrigated pasture and hay are available. In the last three years, many of these small dryland dairies in the state have liquidated or turned to other enterprises because of the increased competition. Their former customers are being supplied by distributors long distances away through the use of the paper container and fast transportation.

Small communities throughout the state that once supported one or two local producer-distributors are now almost wholly supplied by milk shipped in from distant distributing points.

Quality and Availability of Milk has Changed Since 1940

The quality and availability of milk has improved considerably since 1940. Milk of good quality can be shipped throughout the State of Montana from the large western surplus areas. This competition has been instrumental in stimulating improvement in local milk. The local distributor in most cases must either put out a constant supply of good quality milk or face competition from the large distributors in distant distribution points. Butte, the northern edge of Montana east of the mountains, Billings and Lewistown are just a few of the areas where there have been tremendous improvements in the quality and stability of the milk supply. At the present there are still many areas that need to improve the quality and stability of their milk supply. The Miles City area is suffering from poor quality milk and an irregular supply.

Transportation of Milk has Expanded

The transportation of milk in Montana has progressed rapidly in the past six years. Better all-weather roads, faster, more dependable trucks, and great advances in refrigeration have been partly responsible. Processed milk from large distribution points is being shipped throughout the state.

Figure 2 shows the shipments of milk in 1947. 8/ Figure 3 shows the shipments of milk in 1950. Many small villages and even larger towns are now being supplied with milk produced in areas 250 or 500 miles away. It is not uncommon for milk to be transported as far as 650 miles before processing and distribution.

Rapid Developments in Technology

The rapid developments in technology in the fields of processing and transportation are forcing many changes in our milk industry. The introduction of the paper container in Montana has disrupted the old production and distribution boundries. It has opened up new fields of competition for large distributors that heretofore were not available because of the transportation difficulties encountered when shipping milk in glass bottles.

Consumers in some localities seem to have accepted the paper container even when milk in the paper container was one or two cents more per quart. The cost of installing machinery to handle the paper containers is very expensive and beyond the means of the small distributor.

8/Korzan, G. E., Cost of Distributing Milk in Montana.

This has placed many small distributors at a disadvantage and many have liquidated their businesses. 9/

Homogenized milk has been successful in most areas and appears to be increasing in popularity. Customers are demanding more and more of it for their children and other uses. Doctors in some communities have recommended it for baby formulae and young children. There are still some objections to the lack of cream on top for coffee, but many people interviewed stated that they like the homogenized milk for their coffee. The cost of a homogenizer is such that very few small distributors can afford one. This fact has helped the trend of large distributors to take over the market in small communities and drive small distributors out of business.

Other advances in the fields of refrigeration, milking equipment, and processing have helped bring about changes in the dairy industry. These changes for the most part are to the overall advantage of the milk consumer.

Other developments on the horizon in the field of milk processing will bring further changes. Concentrated and canned whole milk are two innovations that are being tested at the present time. What effects these and other developments will have on the milk industry in Montana is uncertain, but we can be sure that they will bring about many changes in the future.

9/There were 187 producer-distributors in 1945 compared to 34 in 1951.

Recent Legal Developments

Added to the changing and complex situations facing the milk industry in Montana are the power and pricing authority of the Montana Milk Control Board. This Board was brought into being by the Twenty-Sixth Session of the Montana Legislature in 1939.

The general purpose of the Montana Milk Control Board is stated:

"The general purpose of this law is to protect and promote public welfare and to eliminate unfair and demoralizing trade practices in the fluid milk industry. It is enacted in the exercise of the police powers of this state." 10/

The record up to now is one of promoting and protecting public welfare by eliminating any price competition between distributors. It can be commended upon protecting the producer and insuring him a reasonable price for his milk. But when a distributor is placed in an unfavorable position with regard to his competitors, his producers will in some cases suffer with the distributor. The producer's market might be in danger if the distributor who buys his milk is losing business and is lowering his milk purchase.

Low Milk Consumption and Surplus of Milk

Milk consumption in Montana is low and the income is high. It therefore seems probable that the per capita milk consumption

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10/Laws of Montana, Twenty-sixth Session, 1939; Chapter 204, pp. 515.

could be raised. Increasing milk consumption would help the entire dairy industry in Montana. The high cost of the machinery required for handling paper containers, homogenization and transportation necessitates a large volume of business. With high fixed costs the distributors must expand output to reduce the fixed cost per item.

The State of Montana is a surplus milk producer. If some of this surplus that now goes into manufactured dairy products could be channeled into milk consumption, the returns to the producer and distributor would be higher. Increasing consumption of milk appears to be one solution to a number of problems that confront our milk industry.

Problems Arising from the Montana Milk Control Law

The major problem facing the milk industry as a result of the actions of the Montana Milk Control Board is the different retail prices enforced throughout the state. Milk that is produced in the Gallatin Valley, shipped to Helena and processed is sold for 21 cents in Helena, Butte, Great Falls, and Billings, while in Alder it sells for 20 cents a quart. Milk produced in the Gallatin Valley and processed in Bozeman is sold for 19 cents in Bozeman and Lewistown; 21 cents a quart in Harlowton and Townsend. This is just an example of the inconsistency found in Montana milk prices.

The failure of the Milk Control Board to enforce that part of the law 11/ which states that the producer shall receive a price for his

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11/Laws of Montana, Twenty-sixth Session, 1939, Chapter 204, Section 7.

milk equal to the producers' price paid in that area where his milk is sold has given some distributors advantage over others. While this section of the law may be an unnatural trade barrier, it is still the law and should be enforced or repealed.

Out-of-State Competition

During the last two years, a large increase in the amount of processed milk shipped into Montana has taken place. This increase is the result of higher prices for milk in Montana than for adjacent states. Milk is entering Montana from North Dakota, Minnesota, Idaho, and Washington. This out-of-state milk appears to be of excellent quality and is sold at the minimum prices set by the Montana Milk Control Board. Out-of-state distributors can absorb the cost of transportation and still make a profit due to the lower producer prices paid in their milk sheds.

High Costs of Adopting New Technology

The high cost of adopting new technological advances in the field of processing and transporting milk is a constant problem to the milk distributor. It is not so much a case of whether he can afford it but of whether he can afford not to. If his competitors install paper containers, homogenizers, or new refrigerated trucks, then, in most instances, he will also have to install them to remain in business. Adopting these new innovations means training the men and usually extensive rearranging of the existing plant. In the past three years, many of Montana distributors have added these new operations to their plants and overhauled or remodeled their entire operations.

This heavy outlay in fixed costs is one of the reasons for increased milk prices and more determined competition for local and distant markets.

Improving the Quality of Milk

One of the important problems facing the milk industry is that of improving the quality of milk sold for consumption. Many people interviewed stated that they used milk for cooking, only. They and their children have either stopped drinking milk or have cut down on milk consumption as a result of the poor quality milk available. Children are good judges of milk, and, in most instances, they will not drink milk with a flavor defect.

If the per capita consumption of milk in the state is to be increased, the milk industry will first have to improve the quality of milk in many areas.

Improving the quality of milk produced on the farm is the major step to be taken. Many of the milk flavor defects are the result of poor production techniques practiced by some of our milk producers. While the major cause of poor quality milk is poor production, the processing and transportation end of the milk industry is not without fault. Many of the people interviewed in southeastern Montana complained of sour milk which was the direct fault of improper processing and transportation. If the consumer in this and other areas is persuaded to increase his purchases of milk, it will only be after the milk industry has taken steps to insure him a constant supply of good quality milk.

Insuring a Constant Supply of Milk

In many areas the milk industry is working on the problem of seasonal milk production. The problem is to insure a constant supply of milk throughout the year. Base surplus plans for the year around purchases of milk are finding favor with the distributor in the state as a means of overcoming large seasonal fluctuation in the production of milk. However, in some areas it appears that other inducements are needed. In a few cases it appears that the only solution is the importation of milk from outside areas where producers are dairy minded and willing to maintain an even flow of milk throughout the year.

Evaluating Merchandising and Advertising

Of all the problems facing the milk industry, evaluating the effect of advertising and merchandising on volume of sales seems to be receiving the least attention. Most distributors advertise to some extent, but few, if any, have evaluated the results of this advertising. Quite a few stated that they were in favor of advertising and thought that it paid but did not know how much. Others felt that money spent on advertising was wasted and that aggressive merchandising was ineffective in increasing milk sales. Some take the attitude that the American Dairy Association does sufficient advertising for the dairy industry. It is evident that here is a field of promotion and endeavor that might be worth considering as a means of increasing milk consumption and aiding the surplus problem in Montana.

CHAPTER II

Alternative Courses of Action Which the Milk Industry Might Take

It is true that research conducted by government agencies can point the way to better conditions, but action on the part of the entire industry is needed to carry out such suggestions before progress can be made.

Four general plans of action are discussed in the following chapter. While these are by no means all of the courses open to the milk industry for improving its position, they do seem to constitute the most important steps at present.

1. Determining the present consumption of milk and taking steps to increase consumption, especially in areas where it is low.

    a. Milk consumption summary of all towns and cities in the State of Montana.

    b. Improve the quality of milk sold to consumers and used for milk products.

    c. Improve the technique of transporting milk from distribution points to small communities and from producer to processer.

    d. More aggressive merchandising of milk and milk products by the milk industry as a whole and individually.

    e. Insure a constant supply of high quality milk sufficient to meet all demands at all times of the year throughout the state.

2. If price regulation is wanted by the industry, then it should insist on a reasonable price and enforcement of all the laws and regulations of the Montana Milk Control Board.

    a. Determine if the producer and distributors of the milk industry desire the present Milk Control Law.

b. If the present control law is desired, then examine its rules and regulations with respect to changing those that are not wanted.

c. Insist on enforcement of those rules and regulations retained.

3. Out-of-state competition must be met with high quality products.

4. Cooperation between distributors in adopting high cost processing equipment when single distributors cannot afford the cost.

Determining the Per Capita Milk Consumption

Most trained investigators who investigate the problem of increasing milk consumption start their research by determining the milk consumption of the area or region being studied. 12/ We must find those areas where milk consumption is low and determine, if possible, why it is low before steps can be taken to increase milk consumption.

While this type of research can be conducted by the industry itself, in the past most of this type of research has been conducted by public institutions with personnel trained in the field of investigation. However, regardless of who undertakes this research, the end result should be a complete picture of the milk consumption habits of the people of Montana. With the data on the consumption of milk and information on the factors affecting the consumers' preferences on milk consumption, the industry can take the necessary steps to improve and raise milk consumption in Montana.

12/Bartlett, R. W., The Milk Industry, pp. 104.

Improving the Quality of Milk for Consumption

In many areas of the state, the quality of the milk sold will have to be improved if people are to consume more milk. The North Central Regional Committee summed up the effect of quality on consumption by stating: "The total effects of quality improvement programs are slow to take place but in the aggregate are very important." 13/

Local producers will have to be informed of the programs and be convinced of the necessity of good quality milk if milk consumption is to be increased. He must be thoroughly shown the importance of the role he is playing in increasing the quality of milk.

Many distributors will have to examine the practices currently employed in their establishments and correct improper processing and transportation techniques to assure that the quality of milk is not being impaired or lowered by his plant operations.

Improving Transportation

Many improvements in the techniques of transportation must be introduced if the quality of Montana milk is to be raised. Numerous distributors throughout the state must invest in or attain refrigerated trucks which will keep the milk at a temperature of 50° F. or lower during the time the milk is being transported. Much of the poor quality milk found in the state is the result of improper equipment's being utilized for milk shipment. Two store managers in

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13/North Central Regional Committee, What Makes the Market for Dairy Products, pp. 42.

Winifred, for example, were compelled to stop handling milk bottled in paper due to the poor quality of the product when delivered to their store from Bozeman. They wanted to handle the milk, but customers resented the fact that a considerable amount of the milk was sour even before it reached Winifred, a small town in central Montana.

Aggressive Merchandising

A more aggressive attitude toward selling and advertising their products may be needed by the milk distributors in Montana. The old attitude that milk is needed in the diet of people and that people will buy what they need is untrue. People do not need alcoholic beverages and tobacco in their diets, but the people in the United States spent twenty billion dollars for these products in every year for the last five years. 14/ There are substitutes for milk in the human diet, and distributors are in direct competition with these substitutes. Many of these substitutes, such as Borden's dry skim milk, are highly advertised from coast to coast. People generally buy what they want, not what they need, and the milk industry should convince the public that it wants more milk.

This can best be done by advertising and selling programs designed to convey to people the idea that milk, aside from being good for them, is delicious and a pleasure to drink. Much progress is being made along these lines by the large dairy companies in the East. Bordan has even brought out syrups that will give milk a variety of flavors.

14/Congressman Bosone, Great Falls Tribune, pp. 1, column 1, vol. 65, #157.

A good selling program seems important in these modern times when so much money is invested in the advertising of products that compete with milk for the consumer's dollar.

Constant Supply of High Quality Milk

All of the above-mentioned efforts will be for naught if the consumer cannot depend on the supply of milk. A constant supply of good quality milk is of utmost importance in increasing the consumption of milk. Many areas of the state are enjoying a steady supply of good quality milk, but other areas are suffering from both eratic supply and poor quality. (Measures to insure a constant supply of good quality milk will be discussed in Chapter V).

Fair Price Regulation and Enforcement if the Montana Milk Control Law is to Remain

Do the majority of the milk producers and distributors want the Montana Milk Control Law? This is a question that we cannot answer, but it should be investigated and answered for the good of Montana's Milk Industry. At the present time, there is evidence of some discontent among the members of our milk industry with respect to the operation of the Milk Control Board. Some of the distributors interviewed were of the opinion that the price of milk was too high. While this cannot be considered as a fact, it is significant that some are discontented with the present price. Some of these distributors felt that the high prices gave too wide a margin of profit and that these conditions would lead to increased competition from large distributors located in other states. Their fears have been realized,

and they now face competition from distributors in Minnesota, Idaho, and Washington.

The distributors of Billings in 1951 refused to pay their fees to the Montana Milk Control Board; this is an example of discontent with the present price regulation. The industry itself must decide what it wants and what is best for it in the long run.

If the milk industry desires the Milk Control Law, then, for its own good, it should examine its provisions and discard those that are disadvantageous to the industry as a whole. One example of failure to enforce the law is the price paid producers whose milk is sold in distant control areas.

The office of the Attorney General was asked the following questions in May, 1949:

1. "If A operates a milk plant in a Milk Control Area, purchases milk from licensed producers in said area, processes, bottles, and ships it into another Milk Control Board area in which B operates, but B's price set by the Board to producers in his area is higher than that paid by A in his area, is the distributor operating in A area required to pay his producers for milk shipped into B area the same as B is paying his producers?"

2. "In a situation where a distributor purchases milk in one market area and ships it to another market area for sale, who must bear the transportation charges? Can the distributor charge it off on the price he pays the producers, i.e., make the producers pay the transportation charges, or must the distributor himself stand responsible for the shipping charges?"

The opinion of the Attorney General, Arnold H. Olsen, follows:

"The authority of the Montana Milk Control Board to fix minimum prices is set forth in Chapter 204, Montana Session Laws of 1939. The following portion of Section 7 of Chapter 204, Montana Session Laws of 1939 is pertinent with respect to your questions.

The Board, after making such investigation, shall fix by official order:

(a) The minimum prices to be paid by the milk dealers to producers and others for milk. The orders of the Board with respect to the minimum prices to be paid to producers and others shall apply to the locality or zone in which the milk is produced in respect to the market or markets in which milk so produced is sold, and may vary in different localities or zones or markets according to varying uses and different conditions .... (Emphasis Attorney General's)

The phrase 'in respect to the market or markets in which milk so produced is sold,' is the controlling portion of the above quoted section. The price to be paid to the producer depends not upon the price set for the market area wherein the milk is produced, but rather is expressly set out in Section 7 ..., such price depends upon the price set in the market area wherein the milk is sold.

In answer to your second question, it is my opinion that the distributor (dealer) must pay the transportation charges himself. Section 7 ..., says the producer shall receive the minimum price subtracting transportation charges from such minimum price. From an equitable viewpoint it appears to be just that the distributor, rather than the producer, should bear such burden since it is for the distributor's own purposes that the milk is shipped to another area.

It is therefore my opinion that a dealer who buys milk in one market area and sells it in another market area, must pay the producer or producers of such milk, the price set by the Montana Milk Control Board for the area where the milk is sold, and cannot subtract from such minimum price the transportation charges incident to shipping the milk from one market area to another, but rather the dealer must be responsible for such charges, insofar as the minimum price set by the Milk Control Board is concerned." 15/

While there is no evidence at hand to show whether the Montana Milk Control Law is helpful or harmful to the milk industry in the long run, it must be remembered that it is in effect a regulated

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15/Official Opinion, No. 18, Volume 23.

price which in itself is normally not consistent with "free-enterprise." If this regulatory method of setting milk prices is used to set the price of milk much higher than necessary for a normal profit, the milk industry may suffer in the long run. Inefficient producers and distributors may be protected, and, in the long run, the consumer may be penalized.

Out-of-State Competition

With the present Milk Control Law in effect, the milk industry in Montana has three means of competition left with which to compete with out-of-state distributors.

The first and most important is quality of milk. The second is service, and the third is setting the controlled price lower.

Most of the milk being shipped into Montana from other states appears to be of good quality. Moreover, this good quality is consistent. It will take considerable effort on the part of our industry to surpass this good quality, but it appears to be the most feasible method of competing with out-of-state competitors. It is probably true that our distributors are in a more advantageous position to provide service than the out-of-state distributors.

While price competition is prohibited under the laws of the state, it is possible for the price to be reduced if the industry wants it. It also appears that some of the large out-of-state distributors have found means to by-pass these laws. It was reported in Butte, for example, that a store owner who handled their milk was charged the

minimum price set by the Milk Control Board, but in many instances the store owner received a gift of butter, which he could sell. This was just a roundabout way of selling milk cheaper. It is almost impossible to prove these transgressions in court, and this leaves the Milk Control Board in the unhappy position of knowing of price violations without being able to do anything about it.

Cost of New Machinery

One problem that is always with the plant manager is the high cost involved in adopting new technological advances. The installation of homogenizers, high-temperature short-time pasteurizers, and paper bottling machines is costly. Most of this equipment needs large volumes of output to pay for itself. Yet we find that many distributors in Montana have installed this costly equipment to meet their competitor. In one city, there are two paper bottling machines where one could easily handle twice the combined output of both operators. One solution to this problem seems to be greater cooperation between distributors in the ownership and/or use of such equipment.

CHAPTER III

Alternative Actions Investigated in This Study

The purpose of this study is to:

1. Determine the per capita milk consumption of all cities and towns of one thousand population or over in Montana.

2. Determine the per capita milk consumption of towns and communities under one thousand population by samples.

3. Find the correlation between the following variables and milk consumption.

   a. milk prices
   b. per cent of milk sold in paper containers
   c. per cent of milk sold through retail stores
   d. per cent of raw milk sold
   e. per cent of homogenized milk sold

4. Determine the reaction of distributors, retailers, and consumers to the paper container.

5. Determine the merchandising practices used by the milk industry.

6. Determine the cleanliness of the distributor plants with respect to quality.

7. Determine how the market for milk for consumption purpose can be expanded by the milk industry.

Procedure Used to Determine Milk Consumption

Various procedures used by other investigators to obtain per capita milk consumption were studied before the adoption of the method used. Most investigations of milk consumption start with the accumulation of data on amounts of milk sold or produced in a given area. These data are then divided by the population of the area. In some studies, the cream consumption was also obtained by the substitution of a determined per cent of the milk produced.

After due consideration of the resources available and the length of time left in which to complete this research, it was decided to follow the general method used by Purdue University in one of its studies. 16/ However, certain modifications were made to fit this method to our requirements.

For greater accuracy, it was decided to obtain per capita milk consumption data in all Montana cities and towns of one thousand population or over. This was accomplished by interviewing all distributors who sold milk in these cities and obtaining from them the total sales in the month of April, 1950.

This month of April was selected because of its position between the high and low levels of milk consumption that occur with the different seasons. 17/ Milk consumption is generally higher than average in the winter and lower than average in the summer. The total sales of milk for consumption purposes in the city for April, 1950 were then reduced to the total sales per day and divided by the population of that city to give the daily per capita milk consumption. Cream consumption was not determined because of the added work involved and the inability of obtaining accurate information.

The same procedure was used for obtaining the daily milk consumption in towns and communities under one thousand population, the only

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16/Hardin, Clifford M., An Economic Analysis of Fluid Milk Markets in Indiana.

17/Blankord, Charles J., An Analysis of Dealers Sales of Milk and Cream in New York Market, 1937-38, pp. 11.

difference being that the towns under one thousand were selected by sample. The State of Montana was divided into twenty-three sections with number one in the southwest corner. 18/ Numbers one, two, and three were placed in a hat and the number drawn out was number three. Sections number three, six, nine, twelve, fifteen, eighteen, and twenty-one were then selected for sampling of milk consumption of towns under one thousand population. During the summer, it was decided to add section one because of the fact that there were sufficient resources available, and section twelve was the only section west of the divide that was included in the sample.

There was considerable difficulty encountered in obtaining information in small towns because of the shift in distribution from small distributors located in these small towns to large distributors located long distances away in large distributor centers. In order to obtain the needed information, it was often necessary to interview these large distributors about their sales in these small communities, and too often they were unable to give satisfactory information.

Determining the Correlation Between Selected Variables and Milk Consumption

There has been a great deal of research in the field of milk marketing on the effect of family size and income on the consumption of milk. However, the amount of research available on other factors affecting milk consumption is small. One such experiment on a rather

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18/Map of State showing sections and their numbers in Appendix.

small scale was conducted by the University of Illinois. They reported on consumer reaction to the paper milk containers with favorable results but did not analyze the effect of the paper container on per capita consumption. They found that the consumer's reaction to the paper container was favorable. 19/

The schedule used was made up so that both consumer reaction to paper and the correlation between paper containers and milk consumption could be determined. 20/

Previous work in the field of milk marketing throughout the East has put much emphasis on the amount of milk sold through retail stores. 21/ As this type of information is not available for Montana, it was decided to obtain accurate information on the per cent of milk sold through retail stores in Montana and to find if there is correlation between the amount of milk sold through retail stores and per capita milk consumption. In most cases studied in the East where some correlation was found, there was also a difference in the price of milk sold through retail stores and delivered to the home by distributors. In Montana, the Milk Control Board has ruled that there shall be no price difference and has set the minimum price at retail the same through

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19/Prucha, M. J., and Tracy, P. H., Paper Containers for Milk.

20/A copy of the schedule used is in the Appendix.

21/Dow, G. F., Consumption and Marketing of Dairy Products in Portland, Maine.

stores and home delivery routes. Therefore, if any correlation is discovered between milk consumption and retail store sales, it will not include any correlation between prices and consumption.

Also of interest to those engaged in the dairy business is the question of raw milk. Many people feel that the amount of raw milk sold will have some effect on the milk consumption of that area. We will try to find out if any correlation exists between the per cent of raw milk sold in a community and that community's milk consumption.

One of the new innovations of milk processing that has been adopted in Montana lately is homogenization. It was decided that it would be of interest to the Milk Industry if the correlation between per cent of homogenized milk sold and per capita milk consumption could be determined.

The correlation between the price of milk and per capita consumption will also be determined. The price used will be the price of regular pasteurized milk in the different markets.

These few above-mentioned factors will be correlated with per capita consumption through the use of multiple correlation analysis.

Reaction to Paper Milk Containers

Since the advent of the paper milk container, there has been much speculation and discussion among members of the milk industry and others interested in the milk industry of the reaction of retailers and consumers to the paper container. To determine the reaction of distributors and retailers, it was decided to interview a random sample of retailers and all distributors on this question. The

consumers' reaction will be indicated by the amount of milk they buy in paper containers when milk is sold both in paper and glass containers. There was no specific question added to the schedule for this purpose, but all distributors interviewed were asked to comment on their reaction to containers.

Determining the Extent of Merchandising Practiced by the Milk Industry

Several people whose assistance was solicited in setting up this research project were of the opinion that the milk industry of Montana was lax in merchandising. They also felt that more advertising could be of benefit in increasing milk consumption. Merchandising is very hard to measure and tabulate, but two questions were added to the schedule to obtain some idea of the amount of advertising and merchandising practiced. One new innovation, introduced into Montana very recently, is the automatic dispensing machine. Question VII of the schedule is designed to find out the distributors' reaction to the automatic vending machine and how many they have installed or are going to install. It will also obtain their ideas on the possibilities of expanding milk consumption with this machine.

The economic effect of advertising is hard to measure unless very complete records are kept, but some researchers believe that the dairy industry could increase milk consumption by education and merchandising programs. 22/ It will be impossible in this project to obtain a

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22/North Central Regional Committee, What Makes the Market for Dairy Products? pp. 45.

detailed account of the effect of advertising in Montana, but it will be possible through Question VI to obtain the distributors' opinion on advertising and its effect on sales.

Inspection of Distribution Plants

In order to judge to some extent the quality of the product produced in milk plants, a detailed inspection schedule has been drawn up with the help of trained milk manufacturing men in the College Dairy Department. The purpose and result of this inspection will be discussed in Chapter V.

Determining How to Expand the Market for Milk

The end product of research of this nature is the formulation of problem-solving hypotheses. To help in this, Question VIII was inserted in the schedule to obtain the ideas of the distributors on how milk consumption and sales could be increased. Much of the research in milk marketing has been on the problem of increasing milk consumption. Many of these projects are aimed at lowering distributors' cost. 23/ Others tackle the problem of greater efficiency in processing and distribution. This project has no such specific plan of action. It will consider all such suggestions and ideas presented by data and interviewers and select those that seem to possess merit for recommendation.

23/Vordar, G. L., Increased Milk Consumption by Lowering Distribution Costs.

Additional Research Conducted in 1951

As the data collected in the summer of 1950 was tabulated, it became apparent that sufficient information was not available for the towns and communities under one thousand population. This was partly due to the fact that most of our towns and communities under one thousand population were supplied with milk from large distributors long distances away. In order to obtain more accurate information on the per capita consumption of milk and other factors, it was decided to conduct a house-to-house survey in the 1950 sample areas.

In the spring of 1951 a schedule was drawn up to obtain the per capita consumption and other data. 24/

Purpose and procedures of the second study were to:

1. Determine the per capita milk consumption of towns and communities under one thousand population by random sample

2. Determine the age and correlation between age and milk consumption

3. Determine the income per family and correlate income to consumption

4. Determine what the consumers thought of the quality of milk they have available

5. Determine where they buy their milk and how long they have bought from the present source of supply

6. Determine their reaction to and preference for:

   a. paper containers

24/Copy of this schedule in Appendix

b. pasteurized milk

c. homogenized milk

7. Determine their preferences for home delivered milk

8. Obtain the per capita consumption of evaporated and powdered milk

Per Capita Consumption

Wherever possible, all of the towns under one thousand population but over one hundred population in a section were surveyed. Where it was not possible to include them all, towns were selected by random sample with the objective of selecting towns of varying sizes. A sample of ten per cent of all families in towns under one thousand population and over one hundred population was obtained from all towns selected. The individual houses were selected by dividing the town's population by four to obtain the approximate number of families and by driving through the town to obtain a picture of the area to be surveyed. The interviewer then selected houses throughout the towns by random sample.

The housewife was asked to give the average amount of milk consumed weekly. This figure was reduced to daily consumption and divided by the members of the household to obtain that family's per capita milk consumption.

The person interviewed was asked the amount of the family income so that the income could be correlated with consumption. The per capita consumption will be correlated with income and age groups by the use of multiple correlation.

It was felt that in many small towns the amount of milk sold in paper containers or as homogenized did not reflect the consumer's preference, because often the only milk available for consumption purposes was milk shipped in from distant distribution centers which consisted of milk in paper containers, often all homogenized. Therefore, all people interviewed were asked what they preferred and how much they would pay for homogenized milk and paper containers.

The other purpose of this study follows those discussed at the beginning of the chapter, and the procedures are technically the same.

PART TWO

CONSUMPTION

CHAPTER IV, MILK CONSUMPTION IN MONTANA (1950)

The average per capita milk consumption in Montana is 0.9 pint per day. But of interest is the fact that our cities and towns of over 1,000 population have a per capita consumption of 0.92 pints per day while the towns under 1,000 population have a per capita consumption of 0.67 pints per day. The average per capita milk consumption for the United States is about one pint per day. 25/

It therefore seems safe to assume that the milk consumption in our larger cities compares favorably with the rest of the nation, while our small communities are below the national average.

25/United States Department of Agriculture, Bureau of Agricultural Economics. FARM PRODUCTION, DISPOSITION, AND INCOME FROM MILK, 1949-50.

TABLE I, PER CAPITA MILK CONSUMPTION IN CITIES OVER 1,000 POPULATION (1950)

Cities	Pints Sold/day	Population	In pt./day Per Capita Consumption
Butte	34,152	46,566	0.73
Missoula	25,188	26,138	0.96
Helena	20,190	20,315	0.99
Anaconda	7,838	11,552	0.67
Great Falls	41,614	42,391	0.98
Billings	34,140	37,389	0.91
Bozeman	20,076	12,242	1.64
Kalispell	13,290	11,716	1.13
Livingston	6,314	7,829	0.80
Miles City	8,644	9,993	0.86
Lewistown	5,616	7,191	0.78
Havre	8,220	9,734	0.84
Deer Lodge	2,900	4,024	0.72
Dillon	2,652	3,491	0.77
Red Lodge	2,604	2,715	0.96
Glendive	4,474	5,276	0.84
Glasgow	4,404	3,810	1.15
Whitefish	3,840	7,250	1.18
Townsend	902	1,316	0.68
Libby	4,220	2,401	1.75
Polson	1,784	2,271	0.78
Hamilton	3,208	2,668	1.20
Hardin	1,414	2,264	0.62
Chinook	1,520	2,299	0.66
Harlem	800	1,103	0.72
Scobey	1,218	1,623	0.75
Baker	Information not available		
Fort Benton	1,300	1,508	0.86
Cut Bank	3,272	3,719	0.88
Browning	1,846	1,674	1.10
Ronan	Information not available		
Terry	800	1,179	0.68
Sidney	3,230	4,215	0.76
Conrad	1,920	1,854	1.03
Malta	2,282	2,085	1.09
Roundup	1,672	2,852	0.58
Big Timber	1,872	1,677	1.11
Choteau	1,014	1,615	0.62
Plentywood	1,410	1,856	0.76
Poplar	1,020	1,157	0.88
Wolf Point	2,200	2,547	0.86
Forsyth	2,320	1,884	1.23
Harlowton	1,416	1,718	0.82
Laurel	2,952	3,843	0.67
Shelby	3,424	3,095	1.10

TABLE II, PER CAPITA MILK CONSUMPTION, TOWNS UNDER 1,000 POPULATION (1950)

Cities	Population	Pints sold/day	Per Capita Consumption in Pints/day
Absarokee	585	460	0.78
Bridger	916	664	0.72
Gildford	351	370	1.05
Big Sandy	697	742	1.06
Sunburst	829	184	0.22
Culbertson	684	454	0.66
Lodge Grass	981	344	0.35
Broadus	790	740	0.93
Crow Agency	351	178	0.5
Ekalaka	842	480	0.57
Plevna	340	110	0.32
Silver Star	58	64	1.10
Whitehall*	957	608	0.63
Wisdom	175	94	0.53
Haugan	117	20	0.17
Superior	672	588	0.87
Hot Springs	775	1638	2.11*
Plains	730	1292	1.76
Thompson Falls	861	1220	1.41
Grass Range	241	160	0.66
Denton	475	300	0.63
Belfry	234	56	0.23
Fromberg	620	120	0.19
Edgar	163	16	0.09
Bainville	471	36	0.07
Brockton	526	24	0.04
Froid	515	100	0.19
Westley	431	80	0.18
Twin Bridges	624	712	1.14
Sheridan	697	888	1.27
Saltese	87	120	1.37
De Borgia	58	36	0.62
St. Regis	351	304	0.86
Paradise	351	114	0.32
Wibaux	731	236	0.32
Fallon	277	72	0.25
Savage	327	72	0.22
Hysham	458	80	0.17
Ashland	76	80	1.05
Lame Deer	1053	80	0.07
Alzada	105	80	0.76
Rosebud	234	144	0.61
Hathaway	29	80	2.75
St. Xavier	93	144	1.54
Roy	187	132	0.7

*Accuracy Questioned

TABLE II, MILK CONSUMPTION, TOWNS UNDER 1,000 POPULATION
(Continued)

Cities	Population 26/	Consumption by Pints	Pints Per Capita
Winifred	351	224	0.63
Moccasin	204	128	0.62
Martinsdale	204	72	0.35
Virginia City	444	320	0.72
Ennis	409	600	1.46
Harrison	263	200	0.76
Boulder	1013	200	0.19
Cascade	490	1120	2.28*
Belt	870	258	0.29
Hinsdale	409	184	0.44
Saco	528	600	1.13
Arlee	234	100	0.42
St. Ignatius	898	500	0.55
Kevin	421	200	0.47
Oilmont	234	800	3.41*
Jackson	58	24	0.41
Lima	648	200	0.30
Melrose	292	30	0.10
Troy	931	312	0.33
Frazer	263	48	0.18
Peerless	234	22	0.09
Reserve	390	22	0.05
Flaxville	292	22	0.07
Rudyard	308	428	1.39
Kremlin	100	320	3.20*

26/The population figures were calculated by taking the 1940 metropolitan population of the cities and applying the per cent change given in the preliminary reports of the 1950 census.

*Accuracy Questioned

Correlation between Selected Factors and Milk Consumption

The four factors selected for correlation with per capita milk consumption were:

Per cent of milk purchased in retail stores
Per cent of unpasteurized milk purchased
Per cent of milk purchased in paper containers
Per cent of homogenized milk purchased

These four independent variables were first plotted on scatter diagrams. They were plotted first as simple correlation and then as multiple correlation. At no time did they give evidence that suggested even a small correlation exists. 27/ However, it was decided to apply statistical multiple correlation to these five variables to determine if any correlation did exist. The method of correlation analysis followed can be found in Chapters 12 and 13 of M. Ezekiel's book. 28/

$\bar{R}^2_{1 \cdot 2345}$ was determined to be .002 which leaves us with the conclusion that the four variables have no correlation with per capita milk consumption. While a very high degree of correlation was not expected, it was felt that these four variables would have some correlation or effect on per capita milk consumption.

Reaction of Distributors, Retailers, and Consumers to the Paper Container

The reaction of the distributor to the paper container is hard to judge or estimate. While there were no specific questions on the schedule, the subject was brought up in the conversation. Most of the

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27/Milk Prices were too close together to give any correlation.
28/Ezekiel, M., METHOD OF CORRELATION ANALYSIS.

distributors who had installed paper bottles were quite pleased with them. Many of them, however, felt that the cost would necessitate a larger volume of business than previously was necessary. In many cases the volume of business had increased, and the paper container received the credit for the increase.

Distributors who were not using paper bottles were quite varied in their opinions. Some felt that the paper containers were a passing fancy, while others indicated that they would have to make arrangements for handling milk in paper containers or take a cut in business volume. Some small producer-distributors have been forced out of business either directly or indirectly by the paper containers.

The retailer or store manager is quite different. Only one of the store managers interviewed had any adverse criticism for the paper container, and that was the amount of sour milk he received in paper bottles. Sour milk cannot be attributed to the paper containers, so that leaves the retailer an unanimous supporter of the paper containers. Their reasons were numerable but they always started with: "I will never go back to the headache of having empty bottles around the store." Other favorable comments were: Takes less space in the cooler. Children do not break them on their way home. House wives like them because they are so much lighter.

These are only a few of the reasons given for their preference for the paper container. Many managers interviewed estimated that

their sales of milk had increased over fifty per cent. This statement may be true in communities where small producer-distributors had ceased operations, but in general it seems quite impossible that paper containers sold through stores, have had any such effect on milk consumption.

It is impossible to judge the reaction of the consumer to the paper container from the data available on this project. At the beginning, it was thought that the sales of milk in paper containers would give a general view of their reaction, but it has become apparent that other factors enter into the sales of milk in paper containers. The quality of the milk and the methods used in processing play an important part in the selling of milk. Also in many localities, milk in paper containers is the only milk available for the consumers. In many others the only homogenized milk sold is in paper containers. 29/

An experiment run at the University of Illinois on consumer reaction to the paper container is summarized in Table 29. The paper container used in this research was the Pure-Pak container which is the type of container used in Montana.

29/See Appendix

"TABLE 29--OPINIONS OF 300 CUSTOMERS CONCERNING"
Relative Merits of Pure-Pak and Glass Bottles.

	Paper Container	Glass Bottle	No Difference
1. Which do you think is more sanitary?	125	33	63
2. In which does milk have the best flavor?	10	37	172
3. In which does milk keep better?	16	31	172
4. In which does milk freeze faster in winter?	23	37	160
5. In which does milk warm up the faster?	34	33	152
6. Which bottle wastes the least space in the refrigerator?	156	16	50
7. Which is easier to pour from?	61	117	43
8. With which is it easier to separate cream from milk?	11	145	63
9. Which is easier to pack for traveling, picnics, etc.?	131	34	56
10. Which is more convenient for housewife?	96	71	54
11. If sold for the same price, which would you prefer when--			
a. Delivered to home?	102	97	22
b. Purchased at store?	110	78	33
12. If sold for 1 cent less per quart in paper, which would you prefer when--			
a. Delivered to home?	147	60	14
b. Purchased at store	140	55	26

After sixteen months of use on the university milk route the paper 30/ container was discontinued for two weeks and then a questionaire was sent out. To the question, "Do you favor the use of paper containers?" One hundred thirty-six replied yes, 14 replied no, and 5 did not reply. Following is a summary of the answer:

30/Prucha, M. V.; Tracy, P. H., BACTERIOLOGICAL AND PRACTICAL ASPECTS OF PAPER CONTAINERS FOR MILK.

Advantages	Number of times mentioned	Disadvantages	Number of times mentioned
1. Less space	105	1. Cannot see cream line	32
2. No washing	97	2. Paraffin cracks off	12
3. More sanitary	59	3. Lack of transparency	10
4. No bottle to put out	50	4. Does not pour well	9
5. Easier to handle	31	5. Leakage	9
6. No disadvantage	29	6. Not easily disposed of	8
7. No breakage	29	7. Not easy to handle	6
8. Light weight	29	8. Carried off by dogs	3
9. Pours well	21	9. Slippery	1
10. Better for picnic use	11		
11. Easier to open	10		
12. Splendid kindling	8		
13. Convenient	5		
14. Good for garbage	5		
15. Noiseless	4		
16. Does not chip box	1		

In the summary the authors state that after four years of using the paper containers and glass bottles, 95 per cent of their customers prefer the paper containers. 31/

Extent of Merchandising Practiced by the Milk Industry

All of the one hundred thirty-eight distributors and producer-distributors interviewed were asked whether or not they used any promotional procedures or advertising to increase their sales. Thirty-four stated that they used no promotion procedures or advertising at all. The rest of those interviewed spent varying amounts of money and time on merchandising. One of the most used promotional procedures was donating products to local bazaars, charity sales, etc. Less then ten per cent advertised their product in the local paper.

31/Ibid.

Only twenty-eight out of the one hundred and thirty-eight had or were going to install dispensing machines in restaurants.

One hundred nine dispensers were installed or on order at the time of the survey. All of those interviewed, except one, who had installed dispensing machines reported an increase of milk sales in the restaurants. One distributor reported that the three dispensing machines installed by his concern had not improved sales.

The following table is a summary of the comments received when distributors were asked how they felt milk consumption could be raised in the state.

TABLE III COMMENTS OF DISTRIBUTORS	NUMBER OF TIMES GIVEN
Improve quality	16
Educational program	12
Promotion and advertising	12
Lower prices	6
Introduces paper containers	5
Outlaw bootleg milk	1
Raise peoples income	1
Introduces homogenized milk	1
Keeps out slot machines	1

The three hundred twenty-four families interviewed during the summer of 1950, had an average per capita milk consumption of 0.87 pint per day, and an average income of $3,300, a year. The average family had two adults over twenty-one, and one and a half children under twenty-one.

The average income, number of adults over twenty-one, children

twelve to twenty-one, two to twelve, and zero to two were correlated with per capita consumption to determine the effect of these five variabilities on milk consumption. All of the procedures and formulae used will be found in Chapters 12 and 13 of M. Ezekiel's book on "Methods of Correlation Analysis." 32/

R^2 1.23456 = .3647 or about 36.5% of the variation in per capita consumption can be explained by the five variables mentioned above. The regression equation is: $X_1 = 3.91 - 2.03X_2 + .425X_3 - 5.333X_4 + 5.46X_5 - 1.938X_6$.

The reader probably has noticed the difference between the two surveys with respect to per capita milk consumption in towns under 1,000 population. The house-to-house survey is probably the most accurate estimate, but even this shows some discrepancies. As an example the 1951 summary appears to be low in members of the average family. However, regardless of the difference and the discrepancies which might exist, they are the results of the data gathered and must be accepted for what they are worth.

The results of the other question asked in the summer of 1950 are shown on Table IV.

32/M. Ezekiel, Methods of Correlation Analysis.

TABLE IV

Summary of the answers received in the house-to-house survey conducted in the summer of 1951. Three hundred twenty-four families were interviewed.

1. From whom do you buy your milk?

(a) Licensed Dairy	70	(e) Both b & c	5
(b) Store	167	(f) Neighbor	20
(c) Unlicensed Dairy	18	(g) Other	0
(d) Both a & b	5	(h) Family Cow	18

2. Do you find the flavor of the milk you buy satisfactory?

Yes....283 No....19

3. Do you find the keeping quality of the milk you buy satisfactory?

yes....285 No....18

4. Has there been seasonal shortages where you received less milk than you ordered?

Yes....14 No....289

5. How long have you bought milk from the dairy or store you are now patronizing?

YEARS		YEARS	
0 - 2	182	6 - 8	12
2 - 4	47	8 - 10	3
4 - 6	27	10 & over	23

6. Have you ever used milk out of paper containers?

Yes....256 No....48

7. How much more would you pay for milk in paper containers?

0	183	3¢	6
1¢	80	4¢	2
2¢	24	5¢	0

TABLE IV (Continued)

8. Would you buy all of your milk at the store if it were: 0-5¢ cheaper per quart?

Cents Cheaper	Number who would buy.	Cents Cheaper	Number who would buy.
0	143	3¢	10
1¢	50	4¢	4
2¢	51	5¢	7

9. Why do you and your family drink milk?

(a) nutrition value...92
(b) taste.....65
(c) both but mostly a..63
(d) both but mostly b..81

10. Is homogenized milk available?

Yes.....290 No.....12

11. Do you use homogenized milk?

Yes.....152 No.....150

12. What proportion of your milk is homogenized?

0 - 20%.....158
20 - 40%.....6
40 - 60%.....3
60 - 80%.....6
80 - 100%.....128

13. How much more would you pay for a quart of homogenized milk?

0.....209
1¢.....48
2¢.....39
3¢.....1
4¢.....___
5¢.....___

14. Is pasteurized milk available?

Yes.....294 No.....8

15. Do you use pasteurized milk?

Yes.....217 No.....85

16. What proportion of your milk is pasteurized?

0 - 20%	95	60 - 80%	8
20 - 40%	3	80 - 100%	190
40 - 60%	5		

17. Have your milk purchases changed in the past year?

Yes	38	No	266

18. Does your family use evaporated milk?

Yes	249	No	73

Large Cans used per Week

0 - 2	128	6 - 8	32
2 - 4	51	8 - 10	9
4 - 6	29		

19. Does your family use powdered milk?

Yes	10	No	312

Pounds used per Week

0 - 2	7	6 - 8	___
2 - 4	2	8 - 10	___
4 - 6	1		

CHAPTER V, FACTORS AFFECTING MILK CONSUMPTION IN MONTANA

Milk consumption is a function of many factors including income, price of milk, price of competing products, quality, and availability. While it is not possible to state which are the most important in Montana, it does seem reasonably clear that availability and quality do affect milk consumption in Montana. Therefore, the following chapter shall discuss these factors and their reaction on milk consumption in Montana.

Quality of Milk

The Dairy Industry in Montana produces some exceptionally fine milk. Unfortunately, however, some of the milk sold as grade A is of poor quality. 33/

One of the larger problems confronting our dairy industry today is that of improving this poor quality milk so as to increase consumption.

Producing Quality Milk

It is common knowledge that a milk processing plant must receive good quality milk from its producers in order to supply high quality milk to its customers. It is impossible to process inferior grade milk into a high grade finished product.

It can then be said that our first step is the production of good quality milk on the farm. Milk produced on the farm must arrive at the

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33/Table IV in the Appendix shows the results of milk scoring through the state in 1951.

plant cool, have a desirable aroma, have a low bacteria count and be free of objectional flavors. To accomplish this, milk must be produced in clean, sanitary surroundings, quickly cooled and delivered to the milk plant in sanitary containers at a temperature below 50° Fahrenheit.

When a farmer decides to produce market milk he should choose enterprises that will compliment 35/ or help his main enterprise. Many of our milk producers also raise beef, sheep, or other products that compete with his dairy enterprise for resources such as labor, capital, and land. His complementary enterprises should provide raw material for his main enterprise, and if he has resources left he should choose supplementary enterprises 36/ that use up the excess resources without interfering with his main or complementary enterprises.

There may be times when an operator has resources which enable him to maintain more than one competing enterprise, and quite often a few head of beef cattle or sheep are supplementary to a dairy operation.

However, too often on our Montana dairy farms the cows are milked late or the equipment is poorly wahsed, because the operator has to hunt

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35/Complementary enterprises help the main enterprise.
36/Supplementary enterprises use resources not utilized by the main or complementary enterprises.

for beef cattle or spend the time with other enterprises. Quite often the quality of the milk produced suffers because of competition from other enterprises. In several cases observed this year sanitation was lax because of the haste in shifting labor resources between two or more competing enterprises.

Unfortunately for our dairy industry, many of our dairy farmers have had neither training nor experience in dairying. Many of our dairymen do not practice proper feeding, pasture management and rapid cooling of milk. Undoubtedly one of the big factors behind the large amount of poor quality milk sold in Montana is the lack of proper training of our milk producers.

Poor quality and a short milk supply generally go hand in hand. In certain areas of Montana, especially in Eastern Montana, there are communities that suffer from shortages of milk. Milk plants in these areas must either use inferior grade milk or ship milk from surplus areas hundreds of miles away. Consumption suffers if the milk plants decide to utilize the poor quality milk from the surrounding milk shed. 37/

The question is raised as to why the inspectors of the Livestock Sanitary Board license these producers if they produce poor quality milk. Their answer is that they are doing the best they can to improve

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37/Roadhouse, C. L.; Henderson, J. L., The Market Milk Industry, p. 175.

quality with their available resources. The facts remain that; first, some producers do produce poor quality milk, and second, that some of our milk distributors buy it to resell to the consuming public.

In many sections of the state the pastures utilized by milk cows are infested with weeds, and milk produced from these pastures contains objectional weedy flavors. Experts in milk flavors agree that feed or weedy flavors can be eliminated by proper feeding and pasture programs. By removing the cows from the pasture three to four hours before milking much of the weedy flavor will be eliminated, and the longer the time between milking and removal from pasture the less weed flavor encountered. 38/ Some of our better dairymen follow this practice while many others do not. In some isolated cases the pasture is too thin to permit this practice. The dairymen with weedy or poor pastures would do well to inquire about pasture management if he wishes to operate an efficient dairy business. Many dairymen in the Miles City area have lost their market to dairymen in the Missoula and Minnesota area because the milk they produced was of poor quality. This poor quality is largely due to improper feeding and pasture management.

Feed flavors are not the only improper flavor found in milk that alert dairymen can remedy. Advanced lactation often gives milk a salty taste. This is especially true in cows that have been milking over a year. Cows with inflamed udders, or chronic inflamations of

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38/Nelson, J. A., "Milk Flavors," Milk Plant Monthly, November 1950.

the udder will often give off-flavored milk for the remainder of the lactation period. This off-flavor is usually salty. 39/

Processing Quality Milk

The treatment and handling of milk at the processing plant has much influence on the quality of the finished product. Of course, a milk plant must have good, fresh, milk without flavor defects to start with if it is to produce a good quality product. This is a general rule that applies to all dairy products. (A high quality product is the result of good quality raw materials and proper handling and processing). It is not unusual for milk plants to turn out inferior grade milk processed from high quality raw milk. This is the result of improper processing and lack of proper sanitation in the plant.

Many milk plants in Montana have inadequate facilities for holding milk until processing. The milk is stacked in cans, usually just inside the door, until processed. This method of holding milk without proper refrigeration is very detrimental to the quality and flavor of the finished product.

Improper pasteurization and cooling contributes to the poor quality of milk in Montana. With the increasing installation of proper pasteurizing equipment and fast cooling facilities, this problem is disappearing. However, the human element is still present and close supervision is still necessary in processing good quality milk.

39/Roadhouse, C. L., The Market Milk Industry, p. 189.

Heated or cooked flavors are less frequently encountered, and stainless steel used in the manufacturing of dairy plant equipment has very largely eliminated metallic flavors. 40/

Some milk plants do not have proper storage facilities for milk that has been processed. Often this milk is held in the plant up to three days, and if not held at a temperature below 50° F. bacterial action will result in quality deterioration. 41/

One of the serious faults of a large number of milk plant managers is poor sanitation. 42/ Pipes, cans, tanks, and other equipment must be properly cleaned and sanitized with live steam, or suitable chemical sterilizers. Milk that comes in contact with unclean equipment becomes contaminated and in many cases picks up off-flavors.

The two general fields of quality improvement in the milk industry are: to improve the quality of the milk produced on the farm; and to improve the care of milk received at the plant and in transit to the consumer.

The care milk receives at the plant is important in a study of quality and with this in mind an inspection form was prepared with the help of a trained dairy manufacturing technician. These inspection forms were filled out while visiting milk distributors. The inspection

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40/Roadhouse, C. L., The Market Milk Industry, p. 192.
41/University of Vermont and State College, Bulletin 313, The Production of High Quality Milk, June 1930.
42/Housekeeping in dairy terminology is the operation of keeping the buildings, equipment and miscellaneous items clean, sanitary and in good condition.

was concerned with the milk plant's appearance, cleanliness, age and condition, general appearance of equipment and attitude and appearance of personnel. Some may question what appearance has to do with quality, but cleanliness and appearance go together. Cleanliness of equipment, surroundings, and employees is of course, definitely tied in with good quality milk. Unclean surfaces on equipment is a breeding place for bacteria, and milk will be contaminated if allowed to come in contact with it.

Age, condition and kind of equipment are very important in quality of milk produced. The age of the building may not affect the quality of the milk, but old buildings are hard to keep clean and free from insects. Also old buildings are often infested with rodents and are hard to ventilate and light properly.

The attitude of the employees would appear to have little effect on the quality, yet an employee or manager who is discontented may not have the pride in a good quality product that a happy contented employee would have.

The appearance of the delivery trucks have little effect on the quality of the product they deliver. This section of the inspection form is used to judge the cleanliness of the operation as a whole, and to some extent to study its merchandising. Many managers take pride in the cleanliness of their plant, but few customers visit the plants. The customer however sees the delivery trucks every day and often comes in contact with the drivers. Delivery trucks should be well painted

and washed. Drivers should be clean, neatly dressed, and obliging. Many a customer has been lost by a discourteous driver, while many customers have been gained by polite and obliging drivers.

The driver and other employees of the plant should wear white uniforms with disposable white paper caps. These will add much to their appearance and the appearance of the plant.

This study of the housekeeping and general condition of our milk distributors was conducted in order to provide an estimate of the amount of poor quality milk which can be improved by the distributor. Twenty-two milk plants were inspected during the summer. The grades based on 100% ranged from a high of 99 to a low of 37. The average was 74 while the Weighted Arithmetic Mean was 73.3%. 43/

TABLE V
FREQUENCY DISTRIBUTION OF GRADES RECEIVED BY 22 MONTANA MILK PLANTS

Grade Per Cent	No. of Distributors
31 - 40	2
41 - 50	2
51 - 60	0
61 - 70	4
71 - 80	4
81 - 90	6
91 - 100	4

TABLE VI
FREQUENCY DISTRIBUTION OF MILK PLANTS INSPECTED
I - PLANT

A. GENERAL APPEARANCE

	POOR	FAIR	GOOD	EXC.
1. INSIDE	7	2	4	9
2. OUTSIDE	6	3	6	7

43/Ma= A + C where A is arbitrary origin add C = $\frac{\Sigma FD}{N}$

	POOR	FAIR	GOOD	EXC.
B. CLEANLINESS	4	2	5	11
1. WALLS	4	2	5	11
2. FLOORS	7	3	4	8
3. TOILET	2		5	3

	NO	YES		
4. PRESENCE OF INSECTS	8	14		
5. PRESENCE OF RODENTS	17	3	=	20

II - EQUIPMENT

A. GENERAL APPEARANCE

	POOR	FAIR	GOOD	EXC.
1. CLEANNESS OF VATS	2	2	8	10
2. CLEANNESS OF PIPES	2	4	5	10
3. CLEANNESS OF CANS	4	1	6	11
4. CLEANNESS OF OTHER EQUIPMENT	2	5	5	10

B. KIND OF EQUIPMENT

1. AGE	NEW 13	OLD 9		
2. STATE OF REPAIR	POOR 3	FAIR 3	GOOD 5	EXC. 11
3. LAYOUT AND ORDER	POOR 5	FAIR 4	GOOD 6	EXC. 7

III - EMPLOYEES, PLANT AND DELIVERY TRUCKS

A. CLEANLINESS

	POOR	FAIR	GOOD	EXC.
1. CLOTHES	6	2	5	8
2. SHAVES	4	2	4	11
3. HAIRCUTS	2	2	3	14
B. ATTITUDE		1	3	17

IV - DELIVERY TRUCKS

A. APPEARANCE OF TRUCKS

	POOR	FAIR	GOOD	EXC.
1. PAINT	3		4	11
2. CLEANLINESS	4	6	7	1
3. ADVERTISEMENT	1	1	5	11
4. AGE AND CONDITION	2		2	14

As indicated in the information in Table V, one of the major faults found with the twenty-two milk plants was the presence of flies. Flies should be rigorously excluded because they are carriers of many diseases harmful to man. They also carry bacteria that will degrade the quality of milk.

Cleanliness and sanitation was very good in most plants except for the floors. In some plants the milk was exposed to the air longer than necessary. Some plants that lack steam relied on chemicals for sanitation. This procedure will work if proper care is taken in cleaning the equipment.

In almost half of the plants visited, equipment was observed that had rough or rusty surfaces. This equipment should be replaced as soon as possible, because rough or rusty surfaces are difficult to keep clean and free of bacteria. 44/

In general, this research was exploratory, intended to determine whether more research is needed into the housekeeping of our dairy plants in Montana. The sample was taken at random and many of our cities were missed entirely. While the results of this inspection shows that many of our dairy plants are very good in housekeeping, about 25% of those inspected were following practices that may affect the quality of their products adversely.

Availability of Milk

The availability of milk throughout the state is good. There

44/Operation and Management of Milk Plants. Circular #260 United States Department of Agriculture, Washington D. C., p. 26.

were no large areas encountered where people could not buy milk. Some areas were faced with seasonal or yearly shortages, but due to the extensive shipment of milk, could furnish their customers satisfactorly. One small area in the southeastern section of the state, Ashland and Lame Deer, have inadequate and erratic supplies of milk. For a short period in 1950 milk that was produced in the Gallatin Valley and bottled in Helena was being shipped to these two communities. This condition lasted for only a short time, however, and in the summer of 1951 they were almost without milk.

Transportation of Milk

The transportation system in Montana has undergone major changes and improvements in the past fifteen to twenty years. Main roads have been changed from rough, muddy, undependable roads to smooth all-weather surfaced arterial highways. Hundreds of miles of main all-weather highways have been constructed throughout Montana. The highway from Big Timber to Lewistown was completed in the fall of 1950. Along with the development of more and better main highways has come the development of a vastly improved network of country roads. Many of our country roads are now surfaced with all-weather black-top or crushed gravel. Most of Montana's cities, towns and villages are now readily accessible from several directions throughout the year. Distance has become less of a barrier to communication and trade between localities within the state, and between Montana and her sister states.

With the advent of the Diesel Locomotives and improved snow

removal equipment, shipments by railroad are much faster and more dependable than formally.

During the same period of time, better trucks have been developed. Refrigerated or insulated trucks are now used frequently for the transportation of milk over long distances. Modern trucks are faster, more efficient, and more dependable. All of these improvements have lowered the cost of transporting milk from one locality to another. The milk distributors located in different areas of Montana quoted a cost of one cent per pound per hundred miles in the shipment of milk. One of the distributors was having milk hauled from Wisconsin and Minnesota in refrigerated tank trucks to Miles City. Some others were shipping processed milk in paper containers up to two hundred miles.

Before 1940 many areas of the state were effectively isolated from each other as far as fluid milk supply was concerned. Butte, for example, is located in an area not well adapted for milk production. Most of the dairymen in the Butte area must buy a large part of their feed from outside areas. The country surrounding Butte is high, mountainous dry land unfit for dairy pasture. Before modern transportation, the dairy industry around Butte prospered even under its adverse conditions, but now with swift low cost transportation bringing increasing competition from outside areas, the dairy farmers around Butte are leaving the dairy business. This same condition has existed in many areas in the dryland sections of our state. Dryland dairy farms could exist because they were the only source of milk, but now milk can, and is being shipped from the western dairy sections to the dry-

land areas of our state. Milk is being shipped 500 miles or more and if handled properly reaches its destination with little loss of quality. The amount of milk being shipped between areas has increased tremendously since 1947, and shows no sign of leveling off. 45/ Dairies that could exist ten years ago because of their favorable position with respect to competing sources of supply, are now faced with growing competition from areas 200 to 500 miles away, and all of the dairymen in Montana are faced with competition from out-of-state milk.

Quality in Transport

Undoubtedly then, one of the more important factors in the quality of milk in Montana is the care which milk receives in transport. In some areas this factor alone is the deciding factor in the determination of good or poor quality milk. Much of our milk in Montana is hauled long distances, and often, it is hauled in trucks unfit for this type of service.

Very little of the milk hauled from producer to distributor is hauled in refrigerated trucks. Some raw milk is hauled in open trucks but most of it is transported in closed trucks without cooling facilities. If the haul is short, the closed truck is acceptable, but large quantities of our milk are produced over one hundred miles away from the milk plants. Milk trucked this far should be refrigerated or cooled in some way. Some managers claim that they can keep milk cool on long

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45/See Figures 2 and 3.

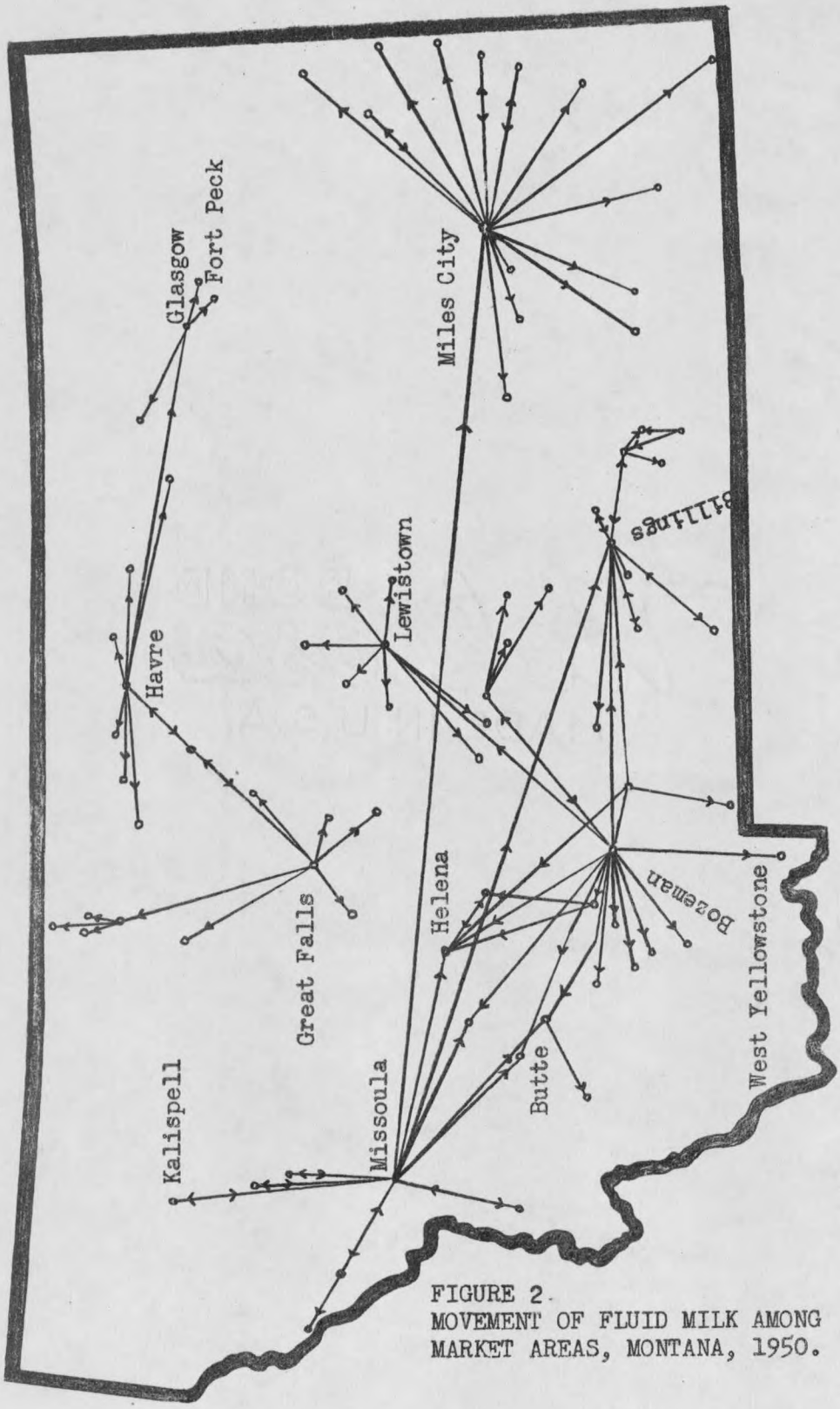

FIGURE 2.
MOVEMENT OF FLUID MILK AMONG MARKET AREAS, MONTANA, 1950.

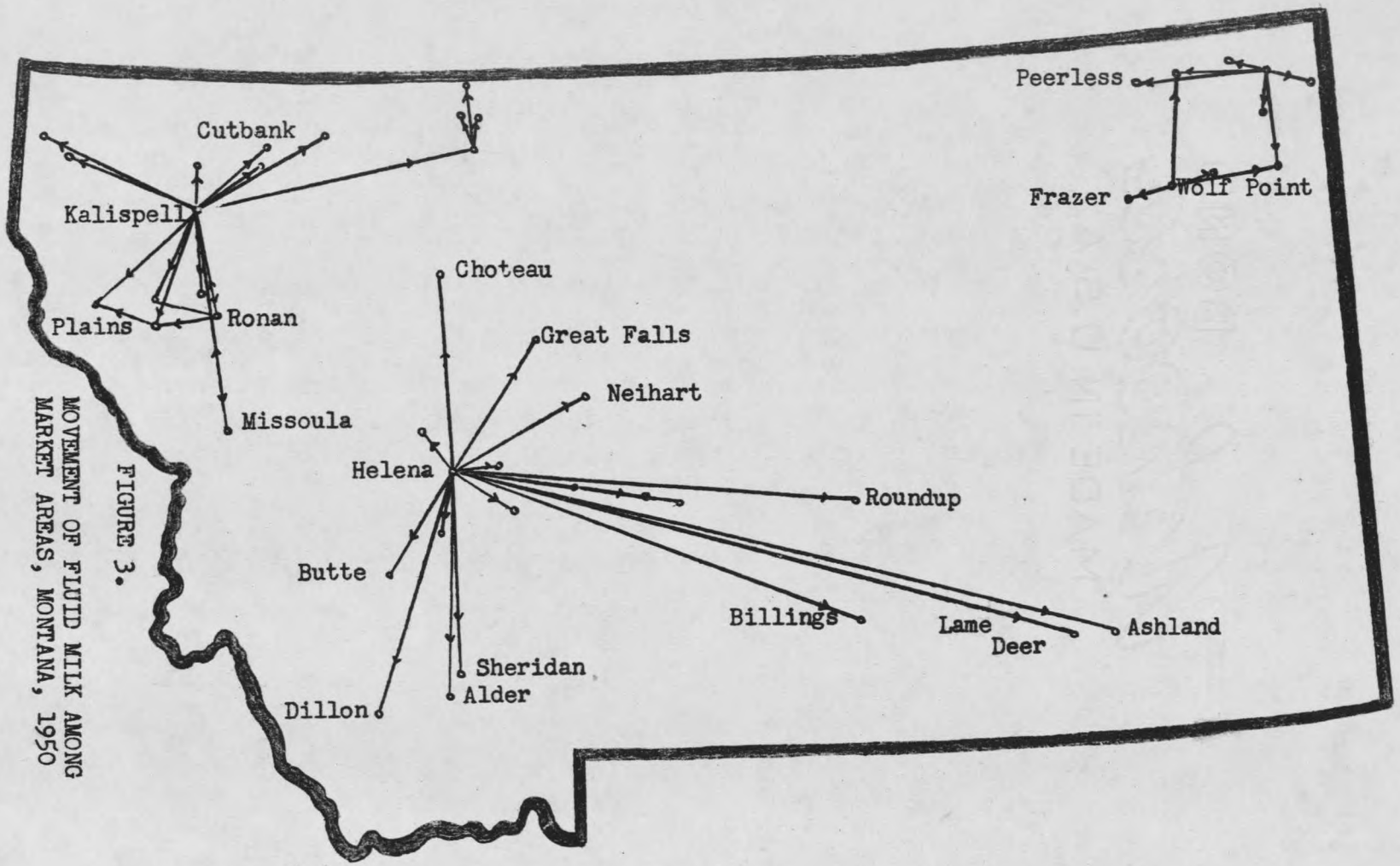

FIGURE 3. MOVEMENT OF FLUID MILK AMONG MARKET AREAS, MONTANA, 1950

hauls by traveling at night. If this is true it would certainly pay some of our milk plants to follow the practice. With the widespread use of the paper containers, large quantities of licensed bottled milk are being transported from city to city by truck and rail. Only a small part of this milk is shipped under refrigeration. Most of it is transported in covered trucks without cooling facilities. Many of the stores and customers who receive this milk, shipped long distances without proper refrigeration, have complained of poor quality, and, in some cases, of sour milk, i.e., a storekeeper at Ekalaka sent three cases or 60 quarts back by stage the day he was interviewed. There is no doubt that much poor quality milk consumed in Montana can be attributed to improper care in transportation.

Storage of Milk

Another factor involved in the quality of milk that needs attention is the care milk receives after being transported long distances. During the last two years many of our small towns and communities have started handling pasteurized milk shipped from the larger cities. A number of stores in these small towns have excellent ccoling facilities, but many others do not have satisfactory cold storage space. The milk is shipped in generally three times a week, and in a few cases, only once a week. These stores have had considerable trouble with sour milk, partly due to improper handling during tansportation and partly due to unsatisfactory cooling space for storage until sold.

Stores that have proper cold storage and receive high quality milk have had no trouble keeping it for seven days or longer. Stores in some outlaying areas have had to discontinue handling milk because of poor storage facilities and for improper handling in transportation.

It is therefore, a matter of adopting the better methods of transportation and cooling to eliminate much of the poor quality milk sold to our consumers. This in turn would probably increase milk consumption in those localities suffering from poor quality milk due to improper handling and cooling during transportation and storage.

PART THREE

CONCLUSIONS AND SUGGESTED RESEARCH

CHAPTER VI, CONCLUSIONS

Milk consumption in Montana is below the national average, but not as low as was suspected. The nation as a whole has a per capita consumption of about 1 pint per day while Montana's per capita milk consumption is about 0.9 pint per day. It does leave the milk industry in Montana the opportunity of increasing the milk consumption to help their business, and alleviate the surplus problem.

The best methods for increasing the milk consumption seems to be:

1. Placing a consistant supply of high quality milk before the consumer
2. Re-evaluation of milk prices, and the system by which milk prices are regulated
3. A well planned campaign of Educational Advertisement and Promotion
4. More Cooperation among the members of the milk industry is adopting new techniques which are costly so as to keep the price of milk down.

Of the factors correlated with per capita milk consumption, income and size and age of family were the only factors found to have any effect on the variations in milk consumption. They explain about 36.5% of the variations which leave 63.5% unexplained. One important factor of milk consumption that was not correlated, which would probably explain some of the variations was quality of milk.

The personal interviews taken in the summer of 1951 show that many

of the preconceived ideas held by dairymen and others have little foundation. Fifty-six per cent of the families interviewed did not believe that the paper containers were worth one cent more than the glass containers. Fifty-six per cent preferred to buy milk at the store, when the price was the same as home delivery.

Only 28% of the families drank milk for its nutrition value alone, while 20% drank milk for its taste alone. Two hundred nine families (65%) did not believe that homogenized milk was worth one cent more than pasteurized milk.

Much more information about the consuming habits and desires of the public must be learned before the consumer can be served to his satisfaction.

Much work must be done before certain sections of the state will have a consistant supply of good quality milk. The southeastern section of the state appears to need improvements the most. The supply is erratic and the quality is generally low in this section.

Many of the problems encountered by the milk industry are growing pains from the recent rapid adoption of new technology. Some of these problems will be solved in time, but new techniques and methods of processing milk are being perfected which will have additional adverse effect on the stability of the milk industry. Canned whole milk and concentrated milk are on the eastern market now. What effects these new developments and others will have on the milk industry is not known, but they are certain to make some

changes.

Suggested Research

As this research project neared completion, it became apparent that many of the answers to the milk industry's problems would not be included. While it is not recommended that large amounts of additional resources be employed in dairy marketing research, it is felt that some additional research would be profitable.

Quality

In many cases after the schedules are taken and the results compiled it is found that better results could be obtained if more information were obtained or if different procedures were followed. In this case it is felt that much better results would be forthcoming if more information were gathered on the quality of milk sold throughout the state and if the per capita income of the larger cities was available.

One of the most fruitful fields of endeavor in the universe of milk marketing research is the field of quality and its effect on consumption. More research in this field is needed and the logical organization to conduct such research is the Dairy Department. If the Dairy Industry Department and the Agricultural Economics Department could run a joint research project on the problem of quality and its effects on the consumption of milk, the results would be of benefit to both the dairy industry and consumers.

Stabilizing the Milk Industry

One problem that has been with the milk industry from its begining is the fluctuations of the milk supply with the seasons. Some of the people interviewed were of the opinion that Montana needed more milk processing plants to stabilize the supply of milk.

A reasonable project to determine the feasability of constructing these plants in Montana and their effect on the milk supply might be a step forward in alleviating this problem of seasonal milk fluctuation.

Effect of New Technology

While research of the type employed in this project has some beneficial aspects, much more benefit as far as the milk industry is concerned, could be had if a forward looking type of project was undertaken. It is generally conceded that the new developments now being perfected will have far reaching effect on our milk industry. A forward type of research project should be undertaken to determine what these effects will be, and how the milk industry can prepare to meet them. This type of research will have to depend heavily on theoretical interpretation of the data gathered on the cost, size, and scope of these new developments.

While the above mentioned research projects may help the milk industry in Montana, they and others undertaken will be of little value to the industry and consumers unless the milk industry itself is willing to accept changes and work for their own benefit.

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46/One additional purpose of this research was to obtain a rather complete file of Milk Marketing Research for future research.

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APPENDIX

LIST OF TABLES

LIST OF FIGURES

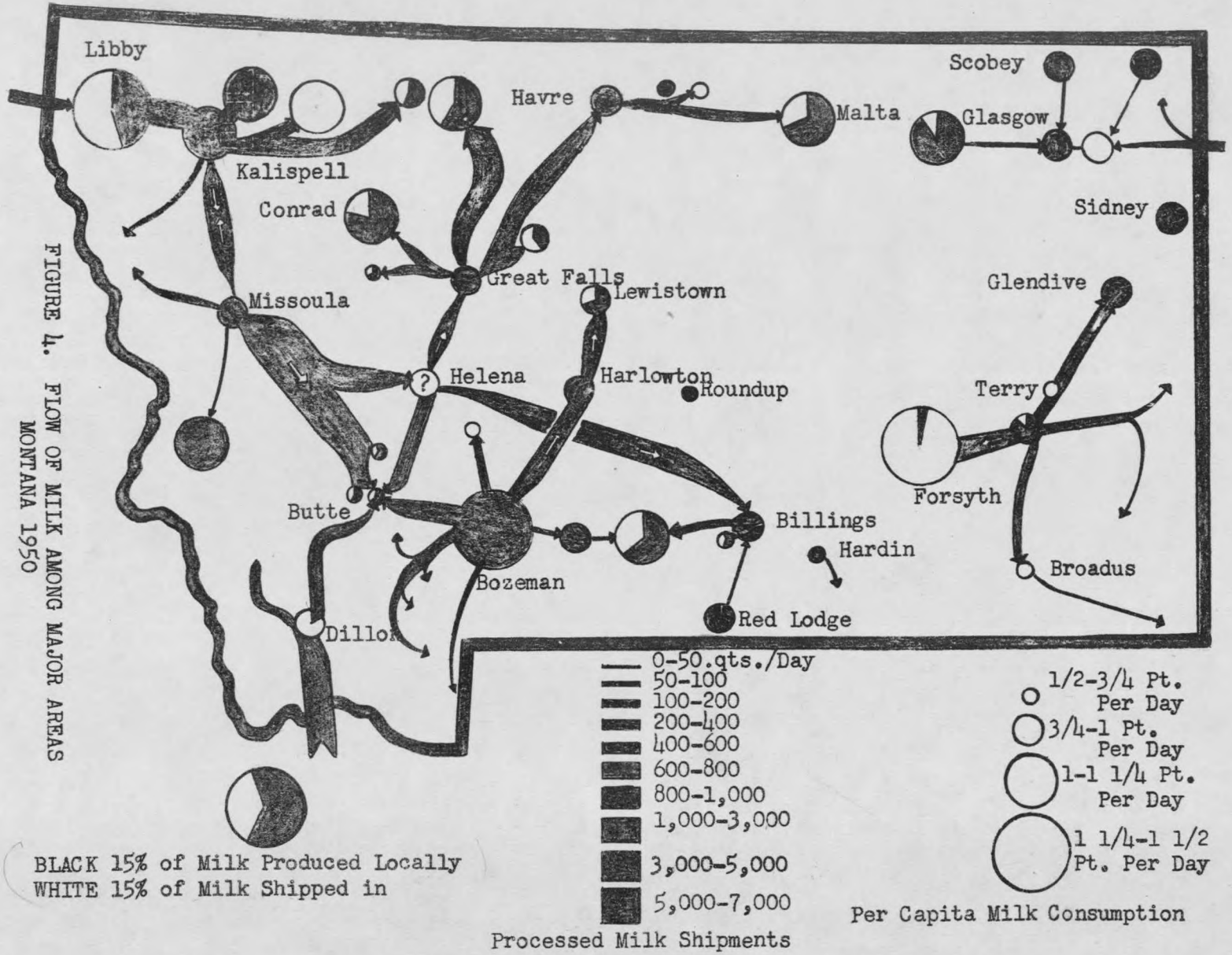

FIGURE 4. FLOW OF MILK AMONG MAJOR AREAS MONTANA 1950

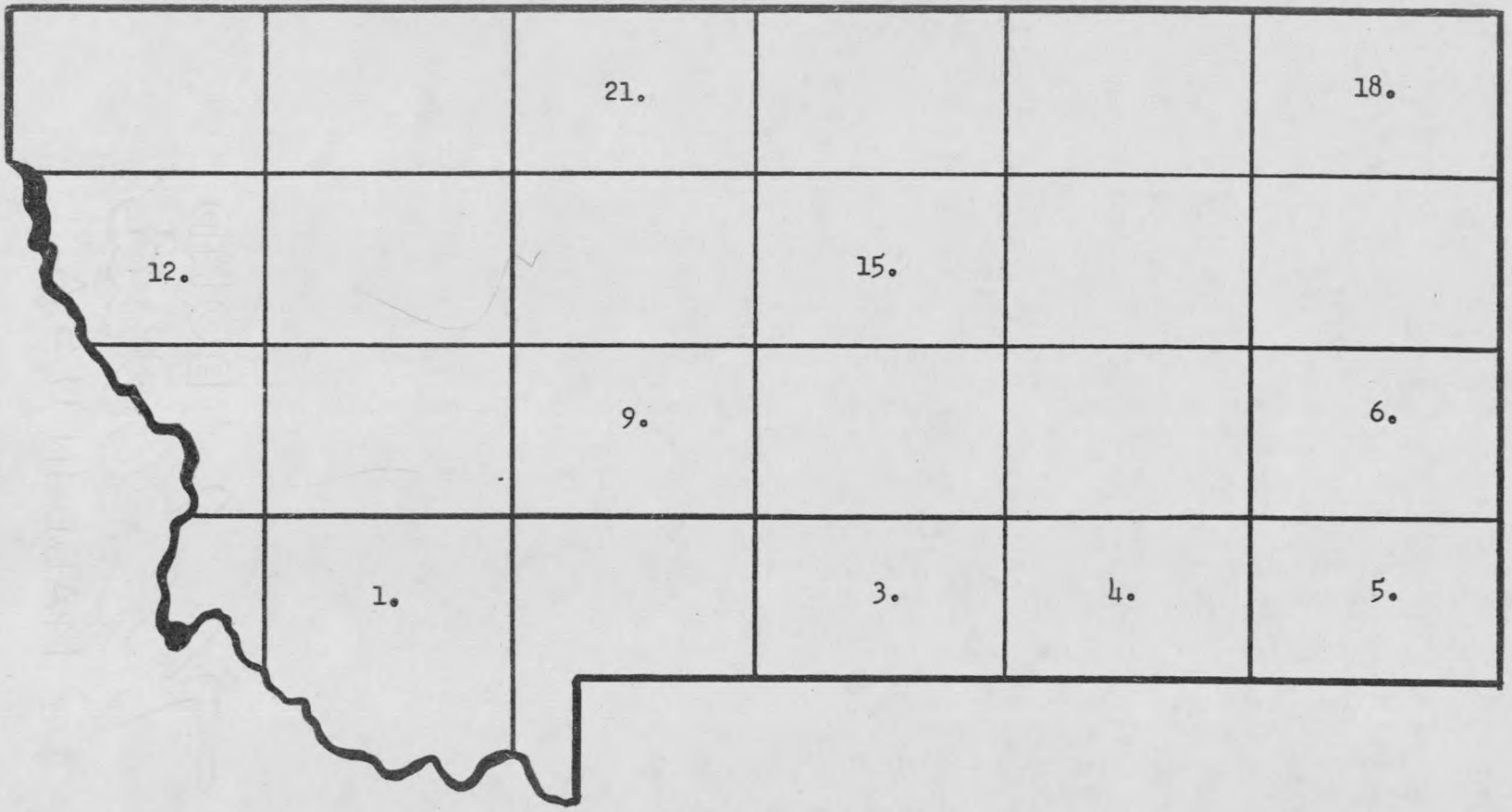

FIGURE 5. AREAS OF MONTANA SELECTED FOR SAMPLING. (1950)

Cities	Raw 47/	Homo. 47/	Paper 47/	Total Sales 47/	Cities	Raw 47/	Homo. 47/	Paper 47/	Total Sales 47/
Absarokee	110	0	0	230	Twin Bridges				356
Bridger	0	0	0	332	Sheridan				444
Gildford	55			185	Saltese	60			60
Big Sandy	93		90	371	Deborgis	18			18
Sunburst	52			92	St. Regis	52	50	100	152
Culbertson	167			227	Paradise		20	57	57
Lodge Grass	90			172	Wibaux				118
Broadus	150			370	Fallon				36
Crow Agency	0	0	0	89	Savage				36
Ekalaka	190			240	Hysham				40
Plevna	55	0	0	55	Gordon				220
Silver Star	12			32	Ashland				40
Whitehall	144			304	Lame Deer				40
Wisdom	47			47	Alzada				40
Haugan	10			10	Rosebud				72
Superior	114	90	180	294	Hathway				40
Hot Springs		200	279	819	St. Xavier				72
Plains		150	296	646	Roy			30	66
Thompson Falls	200	50	110	610	Winifred			40	112
Grass Range	48	5	20	80	Donver				4
Denton	36	10	30	150	Kalispell		6	12	24
Belfry	0	0	0	28	Moccasin		10	40	64
Fromberg	0	0	0	60	Martinsdale				36
Edgar	0	0	0	8	Two Dot				24
Barnville				18	Virginia City		70	160	160
Brockton				12	Ennis		100	300	300
Froid	26			50	Harrison		50	100	100
Westley				40	Boulder		40	100	100
Cascade		100	300	560	Hingham			100	100
Belt			50	129	Joplin			60	60
Huntly				24					
Fort Peck			132	132					
Nashway			80	80					
Hensdale			92	92					
Saco		100	300	300					
Arlee		50	50	50					
St. Ignatius		100	250	250					
Kevin		40	100	100					
Oilmont		10	40	40					
Martin City		100	320	320					

47/All sales figured in quarts

TABLE II, MILK SALES IN CITIES 1,000 POPULATION AND OVER
FOR THE MONTH OF APRIL 1950.

		Retail			Wholesale			Retail and Wholesale		
Cities	Total Sales in Quarts	% raw	% homogenized	% paper	% Wholesale	% raw	% homogenized	% paper	% raw	% homogenized	% paper
Butte	17,076	13.1	11.6	1.3	48.3	1.5	70.6	94.1	7.49	41.28	47.97
Missoula	12,594	3.45	23.19	15.1	59.1	0	36.55	92.38	1.55	30.5	59.15
Helena	10,095	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx
Anaconda	3,919	0	0	0	82.	0	46.59	53.	0	38.27	43.55
Great Falls	20,807	20.74	35.66	13.24	45.39	3.93	51.43	62.29	13.11	42.82	35.51
Billings	17,070	0	33.61	13.62	55.92	0	26.59	56.35	0	29.68	37.52
Bozeman	10,038	0	xxxxx	xxxxx	xxxxx	0	xxxxx	xxxxx	0	29.04	29.64
Kalispell	6,645	0	27.25	0	60.52	0	61.78	100.00	0	48.15	60.52
Livingston	3,157	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx
Miles City	4,322	27.27	0	0	49.09	9.51	0	0	18.55	0	0
Lewistown	2,808	13.83	4.28	3.18	48.5	0	15.27	38.47	7.12	9.61	20.29
Havre	4,110	0	24.48	48.97	40.38	0	30.12	67.46	0	26.76	56.44
Deer Lodge	1,450	19.9	0	0	70.55	0	xxxxx	64.8	5.86	xxxxx	45.72
Dillon	1,326	0	0	0	100.00	0	73.60	81.67	0	73.60	81.67
Red Lodge	1,302	45.49	3.54	3.54	48.	7.68	11.52	21.12	27.34	7.37	11.98
Glendive	2,237	100.	0	0	58.06	7.62	0	0	46.35	0	0
Glasgow	2,202	3.97	29.8	40.39	72.57	0	48.49	71.83	1.08	43.36	63.21
Whitefish	1,920	0	28.81	6.77	69.27	0	48.19	100.	0	40.14	71.35
Townsend	451	0	57.69	26.92	94.23	0	22.68	82.4	0	25.36	61.19
Libby	2,110	4.54	0	0	58.29	0	41.52	84.46	0	20.0	41.23
Polson	892	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx
Ronan	1,436	0	0	0	65.19	0	53.34	76.44	0	33.82	51.94
Hamilton	1,604	39.	0	4.31	45.13	1.38	xxxxx	52.76	22.	xxxxx	26.18
Hardin	707	xxxxx	0	0	39.32	xxxxx	0	0	xxxxx	0	0

TABLE II, (CONTINUED)

Cities	Total Sales in Quarts	Retail			% Wholesale	Wholesale			Retail and Wholesale		
		% raw	% homogenized	% paper		% raw	% homogenized	% paper	% raw	% homogenized	% paper
Chinook	760	0	0	0	34.88	0	0	0	0	0	0
Harlem	400	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx
Scobey	609	66.82	0	0	63.15	80.64	0	0	75.55	0	0
Baker	470	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx
Fort Benton	650	83.33	16.66	16.66	63.07	0	45.12	97.07	30.76	34.61	67.38
Cut Bank	1,636	73.62	13.18	0	66.62	3.85	48.7	43.66	27.38	36.43	41.56
Browning	923	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx
Terry	400	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx
Sidney	1,615	0	0	0	39.93	0	0	0	0	0	0
Conrad	960	0	0	0	68.75	0	30.30	30.30	0	20.83	20.83
Malta	1,141	87.08	0	0	39.61	20.35	33.18	66.37	60.64	13.14	26.29
Roundup	836	51.83	0	0	28.46	57.98	0	0	53.58	0	0
Big Timber	936	0	0	0	54.7	0	29.29	58.59	0	16.02	32.05
Choteau	507	0	27.50	0	60.55	0	49.18	42.99	0	40.63	26.03
Plentywood	705	100.	0	0	88.08	13.	0	0	23.4	0	0
Poplar	510	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx
Wolf Point	1,100	0	0	0	50.9	0	0	0	0	0	0
Forsyth	1,260	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx
Harlowton	708	50.	0	0	49.15	17.24	11.49	57.47	33.89	5.64	28.24
Laurel	1,476	0	25.07	31.34	56.77	0	28.63	56.08	0	27.1	45.39
Shelby	1,712	0	76.92	76.92	54.4	0	80.47	100.0	0	78.85	89.48

x, indicates no information available.

TABLE III
MILK IMPORTED, (DOES NOT INCLUDE MILK SENT FOR BOTTLING)
BY CITIES AND TOWNS IN MONTANA (1950).

Cities	Qts. of Milk Imported	% of Total Milk supply Imported
Butte	5,925	34.7
Missoula	0	0
Helena	xxxxx	xxxxx
Anaconda	1,847	47.1
Great Falls	144	0.7
Billings	1,110	6.5
Bozeman	0	0
Kalispell	0	0
Livingston	0	0
Miles City	616	14.3
Lewistown	970	30.7
Havre	0	0
Deer Lodge	663	45.7
Dillon	1,130	85.21
Red Lodge	96	7.4
Glendive	0	0
Glasgow	400	18.2
Whitefish	0	0
Townsend	451	100.%
Libby	1,150	54.5
Polson	xxxxx	xxxxx
Ronan	0	0
Hamilton	0	0
Hardin	0	0
Chinook	0	0
Harlem	400	100.%
Scobey	. 20	3.3
Baker	xxxxx	xxxxx
Fort Benton	450	69.2
Cut Bank	680	41.6
Browning	923	100.%
Terry	400	100.%
Sidney	0	0
Conrad	200	20.8
Malta	300	26.3
Roundup	0	0
Big Timber	300	32.0
Choteau	157	31.0

TABLE III (CONTINUED)
MILK IMPORTED (DOES NOT INCLUDE MILK SENT FOR BOTTLING)
BY CITIES AND TOWNS IN MONTANA (1950).

Cities	Qts. of Milk Imported	% of Total Milk supply Imported
Plentywood	0	0
Poplar	510	100.%
Wolf Point	0	0
Forsyth	1,200	95.2
Harlowton	0	0
Laurel	630	42.7
Shelby	692	40.4

TABLE IV, RESULTS OF MILK SCHOOLS CONDUCTED IN MONTANA IN 1951

Date of School	Plant Owners	No. of Persons Attending	Milk Samples Scored							Instructors
			Total	Excel	Good	Fair	Poor	Bad	No Score	
	Great Falls									
6-8	Pioneer Dairy	20	46							Dr. J. A. Nelson
6-9	Ayrshire Dairy	30	31							J. O. Tretsven
6-10	Gr. Falls Dairy Jersey Dairy	41	33							Dr. J. W. Safford
	Bozeman									
6-21	Kessler Dairy	22	33							John I. King
6-22	Gallatin Co-op	52	48							L. D. Groom
	Billings									
7-6	Nye Dairy	17	17	0	13	3	0	0	1	Nelson
7-7	Thompson Dairy	12	33							Tretsven
7-8		22	48							Safford
	Kalispell									
10-10	Equity Supply)	38	31	3	19	7	2	0	0	Tretsven
	Greig Dairy)		21	1	10	10	0	0	0	King
	Glacier Dairy)		13	1	10	2	0	0	0	Safford
	Meredian)		4	0	4	0	0	0	0	
	Missoula									
10-12	Community Cry.	78	85	19	44	17	5	0	0	Tretsven
	Meadow Land		27	2	16	7	2	0	0	King
	Garden City	35	33	3	21	6	3	0	0	Safford

TABLE IV, (CONTINUED) RESULTS OF MILK SCHOOLS CONDUCTED IN MONTANA IN 1951

Date of School	Plant Owners	No. of Persons Attending	Milk Samples Scored							
			Total	Excel	Good	Fair	Poor	Bad	No Score	Instructors
	Big Timber									
4-2	Irvings Dairy	12	6	0	3	3	0	0	0	(Tretsven
										(Safford
										(Brooks
	Sweet Grass Cry.		5	0	3	1	1	0	0	(Brooks
	Red Lodge									
4-3	Red Lodge Cry.	21	9	2	6	1	0	0	0	(Brooks
	Miles City									
4-5	Sanitary Dairy	12	32	7	16	8	0	0	1	(Brooks
	Glendive									
4-6	Glendive Cry.	13	11	0	8	2	1	0	0	(Brooks
	Sidney									
4-9	Locker Plant, Cry.	45	10	1	7	1	1	0	0	(Brooks
	Hardy		5	3	2	0	0	0	0	(Brooks
	Glasgow									
4-10	Normont Dairy	54	27	2	18	3	4	0	0	(Brooks
	Chinook									
4-11	Chinook Cry.	35	39	4	24	5	6	0	0	(Brooks
	Ed Tichenor		1	0	1	0	0	0	0	(Brooks
		731	836	64	344	114	38	2	2	

TABLE IV, (CONTINUED) RESULTS OF MILK SCHOOLS CONDUCTED IN MONTANA IN 1951

Date of School	Plant Owners	No. of Persons Attending	Milk Samples Scored							Instructors
			Total	Excel	Good	Fair	Poor	Bad	No Score	
	Helena									
11-8	McHugh)		7	1	2	2	1	1	0	Tretsven
	Phillips)		11	1	7	3	0	0	0	King
	Meadow Gold)	20	12	1	9	2	0	0	0	Dr. J. D. Wipf
	Brookside Dairy)		7	0	4	3	0	0	0	
	Butte									
11-9	Miners Dairy)		26	3	19	3	1	0	0	Tretsven
	Crystal Dairy)		12	0	7	1	4	0	0	King
	Deer Lodge Cry)	45	5	0	3	2	0	0	0	Wipf
	Hanson Dairy)		3	1	2	0	0	0	0	
	State Hospital)		2		1	1	0	0	0	
	Livingston									
11-28	Livingston Dairy)		19	1	12	5	1	0	0	Tretsven
	Farmers Cry)	16	3	0	2	0	1	0	0	King Wipf
	Lewistown									
1-30	Fergus Co. Cry.	40	24	5	11	5	3	0	0	(Tretsven
	Lewistown Cry.		4	0	3	0	1	0	0	(Safford (King
	Burke Cry.		8	0	5	3	0	0	0	
	Ronan									
2-26	Consolidated	51	45	3	32	8	1	1	0	(King

Schedule Number_____

MILK CONSUMPTION SURVEY, 1951

MONTANA STATE COLLEGE

1. People in your family? 0 - 2 _____
2 - 12 _____
12 - 21 _____
21 & over _____

2. How many quarts of milk do you and your family use in a typical week?_____qts. Per capita consumption per day in pints.

0 - .2 _____	1.0 - 1.2 _____
.2 - .4 _____	1.2 - 1.4 _____
.4 - .6 _____	1.4 - 1.6 _____
.6 - .8 _____	1.6 - 1.8 _____
.8 -1.0 _____	1.8 - 2.0 _____

3. From whom do you buy your milk?

(a) Licensed Dairy_____	(d) Both a & b_____
(b) Store _____	(e) Both b & c_____
(c) Unlicensed Dairy _____	(f) Neighbor _____
	(g) Other _____

4. Do you find the flavor of the milk you buy satisfactory?
Yes_____. No_____. (If no, explain)_____

_____

5. Do you find the keeping quality of the milk you buy satisfactory?
Yes_____. No_____. (If no, explain)_____

_____

6. Has there been seasonal shortages where you received less milk than you ordered? Yes _____ No_____

7. How long have you bought milk from the dairy you are now patronizing?

0 - 2 _____	6 - 8 _____
2 - 4 _____	8 - 10 _____
4 - 6 _____	10 & over_____

8. Have you ever used milk out of paper containers? Yes _____
No _____

9. How much more would you pay for milk in paper containers?

0	_____	3¢	_____
1¢	_____	4¢	_____
2¢	_____	5¢	_____

10. Would you buy all of your milk at the store if it were:

0	_____	cheaper?	3¢	_____	cheaper?
1¢	_____	cheaper?	4¢	_____	cheaper?
2¢	_____	cheaper?	5¢	_____	cheaper?

11. Why do you and your family drink milk?

(a) nutritive value	_____	(c) both but mostly a	_____
(b) taste	_____	(d) both but mostly b	_____

12. Is homogenized milk available? Yes _____ No _____

13. Do you use homogenized milk? Yes _____ No _____

14. What proportion of your milk is homogenized?

0-20%	_____	60-80%	_____
20-40%	_____	80-100%	_____
40-60%	_____		

15. How much more would you pay for a quart of homogenized milk?

0	_____	3¢	_____
1¢	_____	4¢	_____
2¢	_____	5¢	_____

16. Is pasteurized milk available? Yes _____ No _____

17. Do you use pasteurized milk? Yes _____ No _____

18. What proportion of your milk is pasteurized?

0-20%	_____	60-80%	_____
20-40%	_____	80-100%	_____
40-60%	_____		

19. How much milk did your family consume in one week a year ago? _____
Reason for change?

(a) pasteurization	_____	(d) a and b	_____
(b) paper containers	_____	(e) a and c	_____
(c) homogenization	_____	(f) b and c	_____

20. Does your family use evaporated milk? Yes _____ No _____

0 - 2 _____	6 - 8 _____
2 - 4 _____	8 -10 _____
4 - 6 _____	

21. Does your family use powdered milk? Yes _____ No _____
Pound per week:

0 - 2 _____	6 - 8 _____
2 - 4 _____	8 -10 _____
4 - 6 _____	

22. Which type of delivery do you prefer? Every day _____
Every other day _____

23. Would you prefer every other day delivery if it reduced the price of milk?

1¢ _____	4¢ _____
2¢ _____	5¢ _____
3¢ _____	

24. Would you prefer delivery three times a week if it reduced the price of milk?

1¢ _____	4¢ _____
2¢ _____	5¢ _____
3¢ _____	

25. What is the family income on the average _____ week, _____ month, _____ year.

Under $500 _____	8500-9000 _____
500-1000 _____	9000-9500 _____
1000-1500 _____	9500-10000 _____
1500-2000 _____	10,000 & over _____
2000-2500 _____	
2500-3000 _____	
3000-3500 _____	
3500-4000 _____	
4000-4500 _____	
4500-5000 _____	
5000-5500 _____	
5500-6000 _____	
6000-6500 _____	
6500-7000 _____	
7500-8000 _____	
8000-8500 _____	

MILK CONSUMPTION SURVEY
Montana - 1950

NAME _____

CITY _____

I. Kind and Quantity of Milk Sold Per Day During April, 1950:

	LOCAL		OUT OF CITY	
	Wholesale (store)	Retail (home)	Wholesale (store)	Retail (home)
a. raw milk				
b. pasteurized, glass				
c. homogenized, glass				
d. Pasteurized, paper				
e. homogenized, paper				
f. other, choc., etc.				

II. Is the milk locally produced?_____ If some is shipped in, where does it come from?_____ % local_____ % other_____

III. What is the route price? glass_____ paper_____

Wholesale (store) price? glass_____ paper_____

Retail store price? glass_____ paper_____

Producer Price? fluid (grade A)_____ market (grade B)_____

IV. During how many months is there a shortage of milk in this area?

_____

Average daily quantity, by months_____

What have you done to meet this problem?_____

V. During how many months is there a surplus of milk in this area?

_____

Average daily quantity, by months_____

Remarks:

VI. Has any special promotion work been done to stimulate trade?____

Of what nature?

VII. Do you plan to install any automatic vending machines for wholesale or retail?_____ What do you think the possibilities are of expanding milk consumption through these machines?

VIII. Do you feel there is a possibility of expanding milk consumption in this area?_____ By what methods?

IX. Additional comments: