



Marketing milk in Montana  
by Helmer C Holje

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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Abstract:

Montana, overall, is a surplus producing area of dairy products.

Large amounts of butter and cheese are being shipped to the urban markets of other regions. Yet, many markets of the state do not have an adequate supply of quality milk to meet year around consumer demands. The deficit areas exist not because the overall production of the area is low, but because the type of production and marketing of milk does not permit the supply to be available to the non-producer.

This problem has become increasingly acute the past decade, during which time a large shift in cow numbers has taken place from the plains region to the more favorable producing areas of the mountain region. This shift has been accentuated by favorable crop producing conditions and cityward migration of our population in the plains region. Feasible means to alleviate these shortages have not been accessible to the smaller markets until only recently. Today, with the advent of the one-trip paper carton and refrigerated truck, milk of high quality can be shipped to all areas of the state. No single marketing process has so completely revolutionized our milk industry as that of the paper carton.

Significant determinations of this study includes (1) Milk production in Montana exhibits pronounced seasonal fluctuations. In 1948 milk production ranged from a low of 36 million pounds to a high of 74 million pounds.

(2) In 1944 producers in the eastern districts retained 50 per cent of their production for farm use, selling 10 per cent as whole milk and 40 per cent in the form of butterfat. Producers in the western districts kept 20 per cent of their production for farm use, selling 38 per cent as whole milk and 42 per cent as butterfat.

(3) A complete reorganization of our present Milk Control Board pricing system appears inevitable if it is to adequately serve the needs of the dairy industry.

(4) Unlike other sectors of the United States, the shortage of a high quality supply rather than consumer income, is the ranking restrictive factor to increasing milk consumption in Montana.

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Recognition is also due the Montana Milk producers and distributors, the Montana Milk Control Board, and Mr. P. J. Creer, State Statistician, for their cooperation and advice in this study.



## MARKETING MILK IN MONTANA

### ABSTRACT

Montana, overall, is a surplus producing area of dairy products. Large amounts of butter and cheese are being shipped to the urban markets of other regions. Yet, many markets of the state do not have an adequate supply of quality milk to meet year around consumer demands. The deficit areas exist not because the overall production of the area is low, but because the type of production and marketing of milk does not permit the supply to be available to the non-producer.

This problem has become increasingly acute the past decade, during which time a large shift in cow numbers has taken place from the plains region to the more favorable producing areas of the mountain region. This shift has been accentuated by favorable crop producing conditions and cityward migration of our population in the plains region. Feasible means to alleviate these shortages have not been accessible to the smaller markets until only recently. Today, with the advent of the one-trip paper carton and refrigerated truck, milk of high quality can be shipped to all areas of the state. No single marketing process has so completely revolutionized our milk industry as that of the paper carton.

Significant determinations of this study include:

- (1) Milk production in Montana exhibits pronounced seasonal fluctuations. In 1948 milk production ranged from a low of 36 million pounds to a high of 74 million pounds.
- (2) In 1944 producers in the eastern districts retained 50 per cent of their production for farm use, selling 10 per cent as whole milk and 40 per cent in the form of butterfat. Producers in the western districts kept 20 per cent of their production for farm use, selling 38 per cent as whole milk and 42 per cent as butterfat.
- (3) A complete reorganization of our present Milk Control Board pricing system appears inevitable if it is to adequately serve the needs of the dairy industry.
- (4) Unlike other sectors of the United States, the shortage of a high quality supply rather than consumer income, is the ranking restrictive factor to increasing milk consumption in Montana.

## PART I. INTRODUCTION

### Preface

The dairy industry is one of the oldest and most important branches of farming in this country. Next to bread and water, milk is used more commonly than any other food or drink.<sup>1/</sup> Yet, nutritionists have estimated that the per capita consumption of milk and its products should be increased 80 per cent to meet the needs of a moderate-cost diet.<sup>2/</sup> A growing recognition of the dietetic value of milk has resulted in considerable public interest in the milk industry. Early manifestations of this interest were focused largely on sanitation. Many laws and regulations have been formulated to attempt to assure the consumer that a high-quality product would be forth-coming. More recently, however, the pricing of milk and regulation of the market have attracted an increasing amount of public interest.

Great strides have been made in improving the sanitary production and processing, and economic distribution, resulting in more efficient use of our economic resources and in turn supplying the consumer with a higher quality product at a lower relative cost. For such the dairy industry must be commended.

However, our attention has been largely focused on the milk supply and price problems of the urban market. Little concern has been given to the sparsely populated regions. The milk problem was not thought to

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<sup>1/</sup> Dairy Industry, Encyc. Amer., Vol. 8, p. 403.

<sup>2/</sup> Bartlett, Roland W., The Milk Industry, p. 165.

be serious when most of the population lived on farms or in small towns and villages. It was felt that an ample supply of quality milk could be provided by the "family cow" or easily obtained from nearby producers.<sup>3/</sup> Only recently has the milk problem in the sparsely populated areas been realized.

In a democracy this is as it should be, the majority rule and their wishes come first. This does not mean, however, that the minority should be neglected. That our government realizes this, is exemplified by the fact that research projects have been initiated to alleviate the existing problems of these peoples and assure all segments of our population a supply of dairy products, incorporating stability, quality, and quantity, at a reasonable price.

#### The Situation

An interesting paradox exists in the dairy industry of Montana. In 1947, Montana produced 1,283 pounds of milk per capita, while the United States per capita production and consumption was 837 pounds.<sup>4/</sup> Thus, Montana produced a surplus 64 per cent above the consumption of the average American consumer. However, in a recent analysis of Montana milk markets it was stated, "one of the most significant findings of this study was that most market areas did not have a stable and adequate supply of milk during the entire year."<sup>5/</sup> In many cases the shortage

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<sup>3/</sup> Milk Supply, Encyc. Soc. Sciences, p. 475.

<sup>4/</sup> U.S.D.A., Agricultural Statistics, 1947, p. 380.

<sup>5/</sup> Korzan, Gerald E., Cost of Distributing Milk in Montana Markets, p. 39.  
(Underlinings are the author's.)

was very acute and necessitated in-shipments from other states.

Market regulation, discriminatory freight rates, lack of organization and concentration of producers and distributors, inadequate market information, inertia among producers and distributors, and inadequate marketing facilities are among the factors contributing to this situation. The results are more easily discernible and in essence are: 1. Producers and distributors are not maximizing returns on their investments, and 2. The consumer in many localities receives an insufficient, unstable, and inferior milk supply.

Normally we would expect to find a third result--that of higher relative price. One commonly associates relatively high prices with deficit products, be it through the free forces of supply and demand or by a "regulated" or "negotiated" price. However, an analysis of Montana milk markets indicates that a situation quite the contrary to this exists. In an overall comparison, it will be found that milk prices ranged from 16 to 20 cents per quart in Montana milk markets and in 24 urban markets of the United States the price averaged 20.5 cents per quart for the same period.<sup>6/</sup> A further breakdown of State markets reveals that in many deficit areas the price per quart is as low, or lower, than in known surplus markets.

One may then rightfully ask, "Is our pricing mechanism doing its job? How, in our capitalistic economy where supply and demand are the

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<sup>6/</sup> Korzan, Gerald E., Unpublished Paper, Montana State College, 1949.

price regulators, can we justify the association of a low relative price with a deficit supply?"

No "cut and dried" remedies for this situation are offered but rather, suggestive plans of improvement that may serve as a basis for formulating procedures and techniques that will in time alleviate the existing situation are presented.

### Objectives

The author, and several others, who are or have been associated with the dairy industry of Montana and similar areas in the sparsely populated regions, feel that a definite problem exists. It is not merely a figment of the imagination. Substantive evidence has been procured to verify the validity of such thinking.

Several pre-suppositions have been made to ground the "ideas" developed in this thesis. These are, that peoples of the sparsely populated regions do desire dairy products incorporating low price and a supply having stability, quality and quantity. These pre-suppositions seem to be so pervasive and obvious that any dispute over their 'trueness' would be pedantic. Thus there seems no reason to believe that these pre-suppositions will invalidate our problem.

The objectives of this study resolve themselves into two distinct purposes: 1. To discover, assemble, and disseminate information relative to the characteristics common to and peculiar to the dairy enterprise of Montana. 2. To discover and develop suggestive plans of improvement that

may serve as a basis for further research, which will ultimately result in maximization of returns to the dairy industry and furnish the consumer a desired product.

#### Qualifications of the Data

A limited amount of primary data was obtained for determining the characteristics of all phases of the dairy enterprise in Montana covered in this thesis. Secondary data were used extensively to "fill the gap" where primary data was lacking and give balance to the study.

The author prepared and collected the schedule used in determining production characteristics.<sup>7/</sup> It was largely of a psychological nature and was designed primarily to secure the reactions of the producer toward regulation in the milk industry, contemplated plans for the future, reasons for being in dairying, and listening to general comments that each individual dairyman might have.

Because a study of this type has definite limitations, schedules were secured only from two selected counties. Those chosen were thought to portray the greatest divergence of characteristics in the dairy enterprise.

This schedule was pre-tested before using it in the field and the weaknesses detected were corrected. Yet, the schedule proved not to be infallible and it was necessary to omit, change, and add to it in the field. In fact, many of the most significant data are the inserted notations on the margins.

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<sup>7/</sup> See Exhibit 1, Appendix.

The author participated in a recent cost of milk distribution survey and thereby had access to much primary data pertinent to the characteristics of the other phases of the dairy enterprise analyzed in this study.<sup>8/</sup> Likewise personal interviews by the author of some of the milk distributors made first-hand observation of their operations possible and has proven to be invaluable.

#### Method of Analysis

Two related but dissimilar methods of analysis will be used in this study. One is purely of a descriptive nature and will serve to give a wider perspective of the situation and problem. Data were synthesized to give congruity of presentation and thus prove most useful for use in further research.

The second method used was entirely theoretical. A hypothetical marketing system was developed which conceivably could alleviate the existing situation. Because of study limitations only those issues deemed most fundamental have been presented.

In this thesis presentation frequency distributions, charts, diagrams, graphs, and arithmetic averages have been used extensively to facilitate comparisons and analogies.

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<sup>8/</sup> This survey is referred to in footnote 7.

## PART II. CHARACTERISTICS OF THE DAIRY ENTERPRISE IN MONTANA

### Introduction

"A chain is no stronger than its weakest link." To ascertain the strength of the "chain" in its entirety it becomes necessary to examine each and every "link" individually. So be it with our milk marketing mechanism. One cannot determine its full value unless every function is examined. Likewise, the more precise and deliberate the analysis, the more exacting will be the final conclusion.

The analysis was begun by describing the characteristics which are common and peculiar to the dairy enterprise in Montana. This enables one to establish a concrete foundation from which corrective measures may arise and thus instill economic progress into our milk marketing structure.

### Production

General Characteristics. Of the eleven western states,<sup>2/</sup> Montana, in 1947, ranked second only to Idaho in production of milk per capita. (Table I). Also Montana, even with a relatively low per-cow production, is one of three western states where production per capita is on the increase. (Table I).

Figure 1 shows that dairying contributes a significant share of the gross value of agricultural production in Montana. The annual return from dairying exhibits much stability and has proven invaluable to the farmer and rancher in "weathering" and adverse economic cycles.

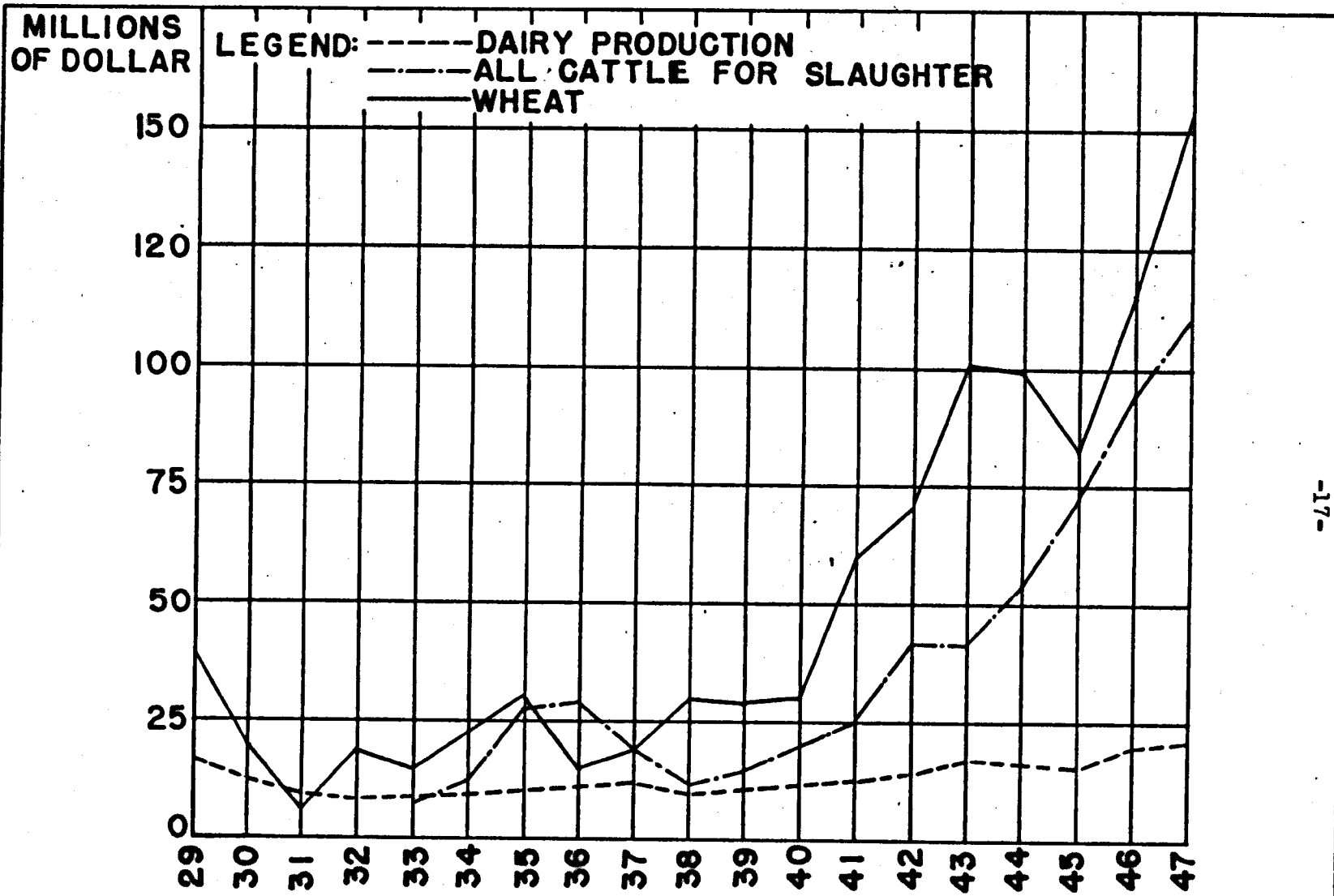
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<sup>2/</sup> Idaho, Montana, Wyoming, Utah, Washington, Oregon, Colorado, Nevada, California, New Mexico, Arizona.



Table I. Total Production of Milk in Selected Groups of Western States, Average Per Capita, and Related Data, for 1940 and 1947.

State and Division	Total Production on farms, 1940		Population		Production per Capita		Decrease or Increase Per Capita	Prod. per Milk Cow 1947
	1940	1947	1940	1947	1940	1947		
	Million pounds		Thousand Persons		Pounds		Pounds	
<b>Far western:</b>								
Idaho	1,228	1,271	525	488	2,339	2,604	265	6,110
Arizona	232	260	500	657	464	396	- 68	5,900
Utah	550	657	550	637	1,000	1,031	31	6,200
Nevada	106	100	110	140	963	714	- 249	5,870
Washington	2,001	2,058	1,736	2,233	1,152	921	- 231	6,450
Oregon	1,394	1,351	1,090	1,517	1,278	891	- 387	5,900
California	4,893	5,996	6,907	9,876	708	607	- 101	7,190
Total	<u>10,404</u>	<u>11,693</u>	<u>11,418</u>	<u>15,548</u>				
Per Capita for division					911	752	- 159	
<b>Mountain States:</b>								
Montana	688	634	560	494	1,228	1,283	55	4,880
Wyoming	292	297	250	275	1,168	1,080	- 88	5,120
Colorado	1,016	1,000	1,123	1,159	904	862	- 42	5,000
New Mexico	287	238	532	550	539	433	- 106	4,100
Total	<u>2,283</u>	<u>2,169</u>	<u>2,465</u>	<u>2,478</u>				
Per Capita for division					926	875	- 51	5,702



**FIG. I GROSS VALUE OF SELECTED FARM PRODUCTS, MONTANA, 1929-1947.**

**SOURCE: APPENDIX TABLE I**

However, what is more important is the type, availability, and utilization of the given production. In Table II is shown the number of gallons of milk long and short per day in each district if we were to make a uniform distribution of the total farm sales of whole milk in Montana among the non-farm population.<sup>10/</sup> The amount available to the non-farm population would then approximate one pint per day per capita. This is comparable to the daily national per capita consumption.

To facilitate such a distribution it may readily be seen that considerable movement of milk would be necessary. The feasibility of this will be explored later. Montana is a deficit area for fluid milk under our present day marketing system. It is only in the western portion and local areas of other districts that an adequate supply of fluid milk is available.

The deficit areas exist not because the overall production of the area is low, but because the type of production and marketing of milk does not permit the supply to be available to the non-producer.

This is well typified by many of the farmers of the sparsely populated regions who produce milk only because of necessity. With the present day inadequacies so prevalent in our milk marketing structure, production for self remains the only alternative to many as a source of supply, (Figure 5). Our milk marketing techniques are not geared to the

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<sup>10/</sup> This base was primarily used to determine the degree of self-sufficiency among districts. Because it approximates the national per capita consumption figure it may also be used as a standard of comparison for each district. It has been recognized earlier in the text that this figure is too low from a nutritional standpoint.

Table II. Surplus and Deficit Fluid Milk Areas\*, By Crop Reporting Districts, Montana, 1939\*\*, 1944\*\*, and 1947\*\*\*.

District	Year	Surplus (gallons)	Deficit
1	1939	3,908	
	1944	9,424	
	1947	11,722	
2	1939		1,075
	1944		1,183
	1947		1,828
3	1939		926
	1944		2,492
	1947		2,677
4	1939		1,475
	1944		3,183
	1947		4,025
5	1939	419	
	1944	0	
	1947		210
6	1939		461
	1944		1,810
	1947		1,996
7	1939		379
	1944		853
	1947		900
TOTAL		25,473	25,473

Source: U.S. Census of Agriculture, 1940, 1945; Montana Agricultural Statistics, 1948.

\*This table represents the gallons in surplus or deficit by districts if a uniform distribution were made of the whole milk farm sales for each given year among the non-farm population. The following figures represent what the average non-farm person would receive for each of the years listed in Montana: 1939 - 31 gallons, 1944 - 46 gallons, and 1947 - 44 gallons. Comparable figures for the United States are: 1939 - 53 gallons and 1944 - 75 gallons.

\*\*Actual production figures taken from the U.S. Census of Agriculture.

\*\*\*Projected figures based on estimated cow number changes as taken from Montana Agricultural Statistics, 1948.

era of specialization in the sparsely populated regions and the law of "comparative advantage" becomes limited in its use. Inefficient use of our economic resources and "excess waste" of the given product becomes a logical result.

Specific characteristics of production which seem to be most pertinent to this study will next be analyzed in detail. The first part of the discussion will be concerned with physical characteristics in which numerical and graphic comparisons are expedient. In the second part, psychological characteristics will be described.

Concentration. Figures on concentration of milk production in local areas in various districts, which are the only specific indicators of concentration, are not available for this study. General comparisons by districts are shown in Table III.<sup>11/</sup> Concentration comparisons by districts are dangerous, even when used with care. A heavy local concentration is possible even in districts of relatively low concentration. This is particularly true in districts where scattered irrigation developments are prevalent. Yet, if one is cognizant of the shortcomings of general comparisons, they may be used to broaden one's perspective. Where general concentration is high, the probability of local concentration runs high; and, conversely, where general concentration is low, the probability of local concentration runs low.

Table III shows that nowhere in the plains area is there a general concentration of one milk cow per square mile. In the West, general

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<sup>11/</sup> See Figure 2 for the district breakdown.

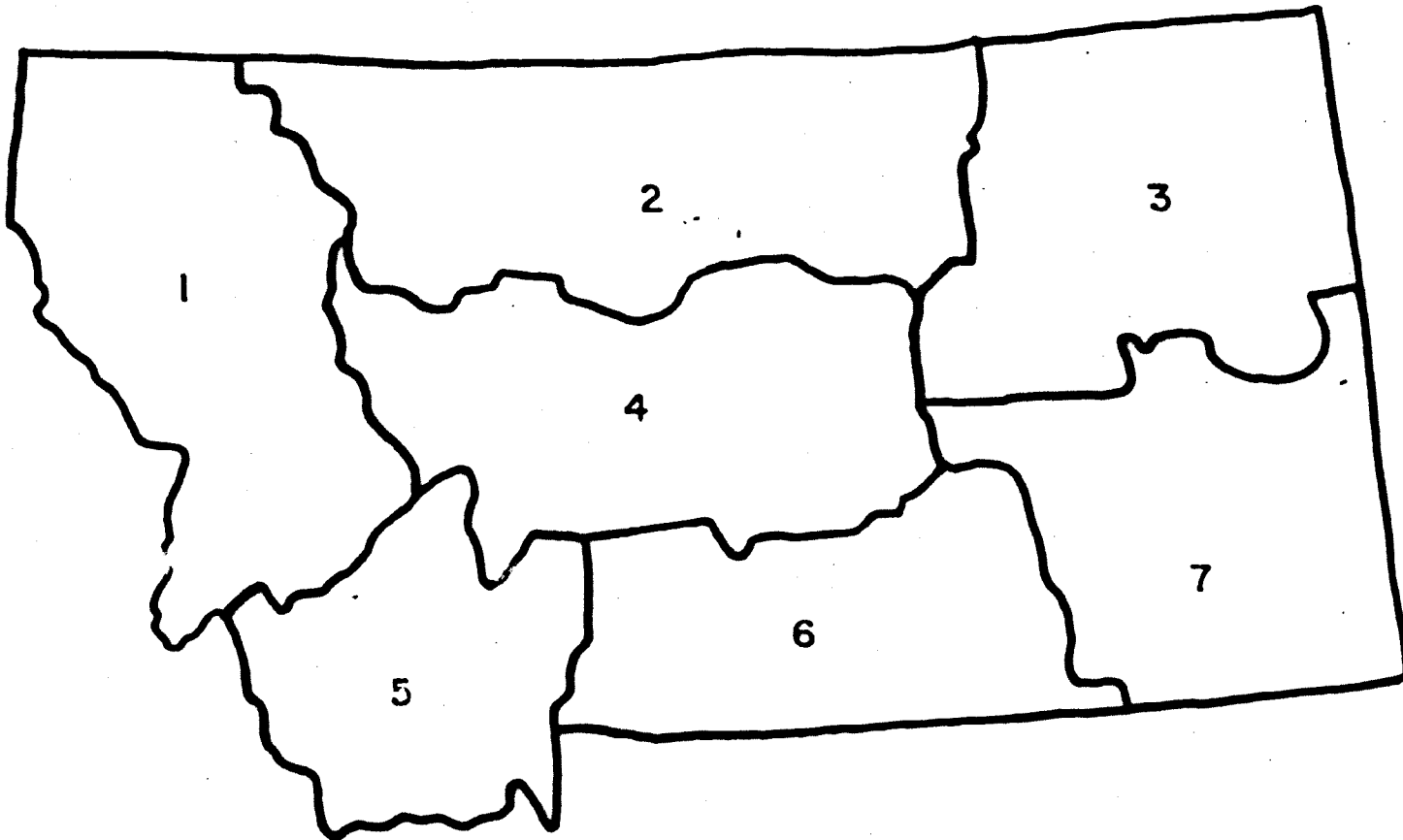
Table III.\* Milk Cow Numbers, Cows Per Farm, Cows Per Square Mile, Persons Per Cow, Production Per Cow, Production Per Capita, and Related Data, Montana, 1939\*\*, 1944\*\*, & 1949\*\*\*.

District	Year	Number Milk Cows*	Cows Per Farm*	Cows Per Square Mile	Acres in farm per cow	Gallons Per Sq. Mile	Persons per Cow	Average Product. Per Cow (Gals.)	Production per Capita (Gals.)
1	1939	31672	5.3	1.3	87	835	3.8	642	170
	1944	33878	6.2	1.4		842	3.5	602	170
	1949	35335		1.5		948		632	186
2	1939	17484	3.4	.7	635	348	4.0	497	125
	1944	16301	3.4	.6		340	4.3	558	130
	1949	11981		.4		234		586	101
3	1939	16895	3.4	.8	436	384	3.7	480	129
	1944	17674	3.7	.8		347	3.5	441	124
	1949	13396		.6		278		463	99
4	1939	17580	4.5	.8	478	390	5.6	556	99
	1944	17180	4.4	.8		441	5.8	565	98
	1949	13074		.6		356		593	78
5	1939	15275	6.6	1.1	219	670	5.9	609	103
	1944	13981	6.2	1.0		657	6.5	656	102
	1949	12541		.9		620		689	96
6	1939	21566	4.5	1.3	294	727	4.0	559	140
	1944	22139	4.9	1.3		698	3.9	536	137
	1949	19062		1.1		619		563	125
7	1939	9349	3.7	.5	761	222	3.4	444	131
	1944	9350	3.6	.5		216	3.4	455	134
	1949	7780		.4		191		478	118
Mont.	1939	129821	4.4	.9	358	502	4.3	558	130
	1944	130503	4.6	.9		494	4.3	554	129
	1949	110145		.8		466		582	115

\* All references to "cows" is to "cows" used for milk.

\*\* Calculations based on, Montana Agricultural Statistics, December 1948.

\*\*\* Projected figures based on information secured from BAE farm reporters.



-21a-

FIG. 2 DISTRICT BREAKDOWN

concentration is all greater than one milk cow per square mile. Even this cannot be considered heavy compared to concentrated dairy regions, but it does indicate where the heavier concentrations may be found. To support this analysis, three representative dairying counties, Lake, Ravalli, Gallatin, were picked to indicate the amount of local concentration in western Montana. These counties comprise approximately 4 per cent of the land area of Montana and contain 19 per cent of the total dairy cows.<sup>12/</sup> A further comparison by acres in farms per cow shows a still greater divergence among districts, (Table III).

Thus, it becomes apparent that, save for a few local areas where irrigation developments are prevalent, the concentration of dairying is centered in western Montana in three or four local areas. For the remainder of the state, dairying is widely dispersed.

Milk Produced. Comparisons of per-cow production and per capita production, among districts, have been made. The first is valuable in indicating the relative efficiency of production, and the latter portrays the amount of milk that could be made available for use. Whether it is or should be made available is a question for further study.

It is only in the two western districts that a yearly per-cow production of 600 gallons is reached, (Table III). The two eastern districts are low with a 455-gallon yearly average for the years 1939 and 1944. Percentagewise, the western district's average is 28 per cent greater.<sup>13/</sup>

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<sup>12/</sup> Computations based on the United States Census of Agriculture, 1945.

<sup>13/</sup> Computations based on the United States Census of Agriculture, 1940, 1945.



No significant differences are noted in production per capita between the western and eastern sectors. It is true that District I is considerably higher than any other district, but this is offset by the relatively low production per capita of District 5. Only a slight deviation from the mean of the state is shown by the eastern districts for the years 1939 and 1944. But preliminary production figures for District 3 in 1949 indicate a serious per capita production drop, (Table III).

The per capita production has been downward in all districts of the plains area; has remained constant in the southwest district; and has been upward in the northwest district, (Table III). This is a direct result of a change in dairy cow numbers, (Table III). The loss in dairy cow numbers has been most pronounced in the plains districts where favorable weather conditions have accentuated the comparative advantage of crop production. A "cushioning" of the production drop has been effected by an increased per-cow production, but this increase has not been great enough to offset the tremendous cut in cow numbers in the eastern districts, (Table III). Conversely, the west has had an increase in per capita production. Not only through increased per cow production, but through increased cow numbers as well.

These trends are not significant in themselves. Rather, they are significant as a body for they clearly point out the shift of our dairy resources from east to west during the past decade.

Unit Size. In speaking of size, particular reference to the number of producing units, i.e., cow numbers, has been made. Comparisons of

"economies of scale" in dairying are applicable only to producing units. Though land area sets specific limitations on the scale of an enterprise, it is inadequate for unit comparisons because of use intensity.

Cows per farm range from a high of 6.6 in District 5 to a low of 3.4 in Districts 2 and 3. In an east-west comparison, Districts 1 and 5 have an average of 6 cows per farm, and the plains districts have an average of 4 cows per farm, (Table III).

A comparison among Bureau of Agricultural Economics farm reporters in two selected counties shows a still greater divergence between east and west in dairy cows per farm.<sup>14/</sup> In Ravalli County, farm reporters averaged 8.9 cows per farm in 1948. Cow numbers per crop reporter in Custer County averaged 3.1 in 1948. The percentage change in cows per farm is likewise significant. In Ravalli County the cows per farm were increased 16 per cent from 1947 to 1948. In Custer County a decrease of 16 per cent was noted for the same period, (Table IV).

The foregoing figures have been representative of all cows used in dairying. A comparison of fluid milk producers in Ravalli and Custer counties, who were cooperators in a recent survey, produced similar results.<sup>15/</sup> Though the unit size is much greater in fluid milk production, the comparative ratio is still roughly two to one, averaging

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<sup>14/</sup> The Bureau of Agricultural Economics have representative farmers to whom they mail questionnaires upon which production estimates are based. These farmers are referred to as farm or crop reporters.

<sup>15/</sup> Refer to footnote 7.

Table IV. Average Herd Size For Selected Counties

Montana 1947, 1948\*

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	1948	1947	Percent Change
<u>Ravalli:</u>			
Number Farms	50	50	
Number Cows	444	384	+ 16
Cows Per Farm	8.9	7.7	
<u>Custer:</u>			
Number Farms	30	30	
Number Cows	92	110	- 16
Cows Per Farm	3.1	3.7	

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Source: Montana Federal Agricultural Statistical Service; Bureau of Agricultural Economics, USDA, Helena, Montana

\* Sample inclusive of BAE Survey.

approximately 20 cows per unit in Ravalli County and 9 cows per unit in Custer County.

Seasonality. Perhaps no other production factor contributing to inefficiency in dairying, not only in production but in processing and distribution as well, has received as little attention as seasonality in production. Only two or three local areas, to the author's knowledge, are initiating measures to "level" seasonal production.

Milk production in Montana in 1948 ranged from a low of 36 million pounds in December to a high of 72 million pounds in June--a change of 100 per cent, (Figure 3).

Production figures by district or county are not available; but present and contemplated breeding plans were asked of the fluid milk producers. In Ravalli County each and every producer interviewed was carrying out breeding practices designed to prevent seasonality. The percentage dropped to 70 per cent in Custer County.

Probably these figures are somewhat higher than is actually the case. People are prone to over-emphasize good practices and under-emphasize the bad. Individual production figures would be the only definite means of ascertaining the amount of seasonality.

"Enterprise Dairying." Of all the varying reasons given to the question, "Why did you choose dairying as an enterprise?" the universal reply was, "It provides a stable income daily." Other reasons given were:

1. Used as a supplementary enterprise and helps to 'round' out my farming operations.
2. Natural love for dairying.
3. A good source for fertil-

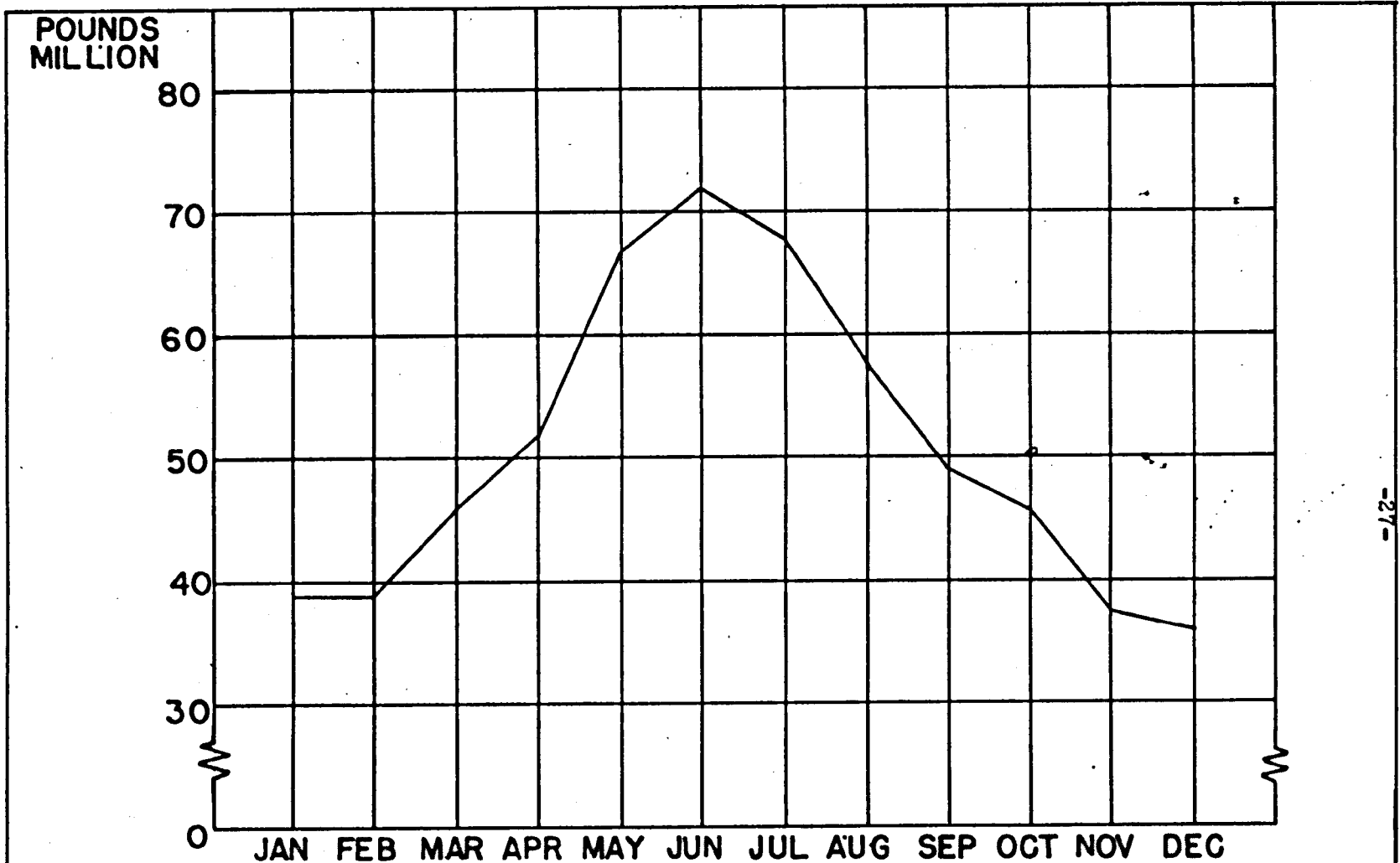


FIG. 3 MILK PRODUCTION IN MONTANA BY MONTHS, 1948.

SOURCE: APPENDIX TABLE II

izer, and 4. Past experience has proven dairying to be the most profitable enterprise in this area.

Reasons for quitting dairying were: 1. Hard steady work, 2. Little profit, 3. Unable to secure labor, 4. Unsatisfactory butterfat tests, 5. Old age, 6. Complete retirement, and 7. Highway construction cut farm into an uneconomic unit.

All producers interviewed favored a continuation of sanitation and price regulation. Most producers were reluctant to express their views on retail price regulation, but supported producer price regulation unani- mously. Likewise, all were in favor of continuing sanitation regulation and none felt that present-day strictures were oppressive. In fact, many felt regulatory boards were too lenient, particularly to distributors who were using class B milk for class A purposes when conditions did not war- rant such a practice. Many felt that sanitation regulations for butterfat production should be invoked. Others felt that compliance costs would force many butterfat producers from production and result in serious shortages of manufactured dairy products.

Apparently management practices promoting efficiency are being used to a greater degree in Ravalli County than in Custer County. All co- operators in Ravalli County had an up-to-date production record of each producer. They exhibited great pride in their herds and expressed a desire to "show" a person around--they were, in effect, "fired up." Equip- ment and buildings exhibited characteristics of "good housekeeping;" neat- ness and cleanliness prevailed.

It was also interesting to note the widespread knowledge of dairying that these operators possessed. They were well versed on current dairying practices, not only in production, but in distribution as well. Dairying is their major enterprise and it was apparent they intended it to be such in the future. Old age and retirement were the only reasons given for leaving the dairy enterprise--reasons not attributable to economic failings.

Management practices of many dairymen in Custer County were expressive of inertia and decadence. Buildings and equipment were, in many cases, slovenly kept, little or no pride was expressed in the dairy herd, individual production records were not available, and a general feeling of discontent was prevalent.

This contrasting situation in Custer County may be attributed to:

1. Only 20 per cent of the cooperators considered dairying their major enterprise,
2. Farmers were unorganized and dissemination of dairy "know how" was restricted,
3. The majority were resettlement farmers who had been engaged in dairying only a few years,
4. Many settlers were "washed out" dry land farmers and lacked the persistency so necessary in efficient dairying,
5. Many expressed a general dissatisfaction with distributor buying practices,
6. Fixed costs were high and operators had little capital to invest in equipment necessary to achieve an optimum output level,
7. Envy of their dryland neighbors, who were capitalizing upon favorable economic conditions, was apparent. It was only a few years ago that most of them were one of this very lot, and reaped not the fortunes of destiny, but instead, suffered the adversities.

Highlights of production characteristics are: 1. Montana is a surplus milk-producing area and a deficit area for fluid milk, 2. Western Montana is the major producing area and is the only major area exhibiting characteristics which are typical of efficient dairying, and 3. A continual shift from east to west of Montana's dairy resources has taken place during the past decade. This has been accentuated by favorable crop producing conditions and a general city-ward migration in the dryland areas.



Processing and Distribution

Efficient methods of processing and distributing dairy products have long been the subject of investigators. Relatively low marketing margins make higher producer prices and lower consumer prices possible—a great aid in effecting a continuous supply of quality milk and in increasing per capita consumption.

Yet, we must not be too critical of marketing margins. To squeeze distributor margins excessively can only result in a loss of services—services which we, as consumers, are demanding.

Equitable returns with efficiency have become the keynote in marketing studies. The determination of an equitable return to each and every resource becomes increasingly complex as our social institutions change and technology advances. In fact, the pressures of technology have become so great that restriction of the market has been necessary to allow regulatory boards to satisfy vested interests in many areas. This results in "inequitable" returns and consequent maladjustment to the dairy industry.

One cannot determine an "equitable" return within a given market place.<sup>16/</sup> The market area in its entirety must be considered.<sup>17/</sup> It is only then that we will achieve maximum efficiency. It is not necessary to

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<sup>16/</sup> Market place is a point at which the exchange of goods or the exchange of title to goods takes place.

<sup>17/</sup> Market area may be defined as covering the territory over which the same forces of supply and demand are at work on prices, so that prices in one part of the area tend to be rather quickly affected by price changes in other parts of the area. (See Dowell, Austin and Bjorka, Knute, Livestock Marketing, p. 1.)

be concerned with the cost factors of form utility (production and processing) in every market place. It is only necessary to know what is an "equitable" price in each and every market place within the market area. To arrive at an "equitable" price in each and every market place within the market area, it is necessary only to add an "equitable" charge for time and place utility.<sup>18/</sup>

The following discussion will point up characteristics in processing and distribution that are the "roots" of inefficiency.

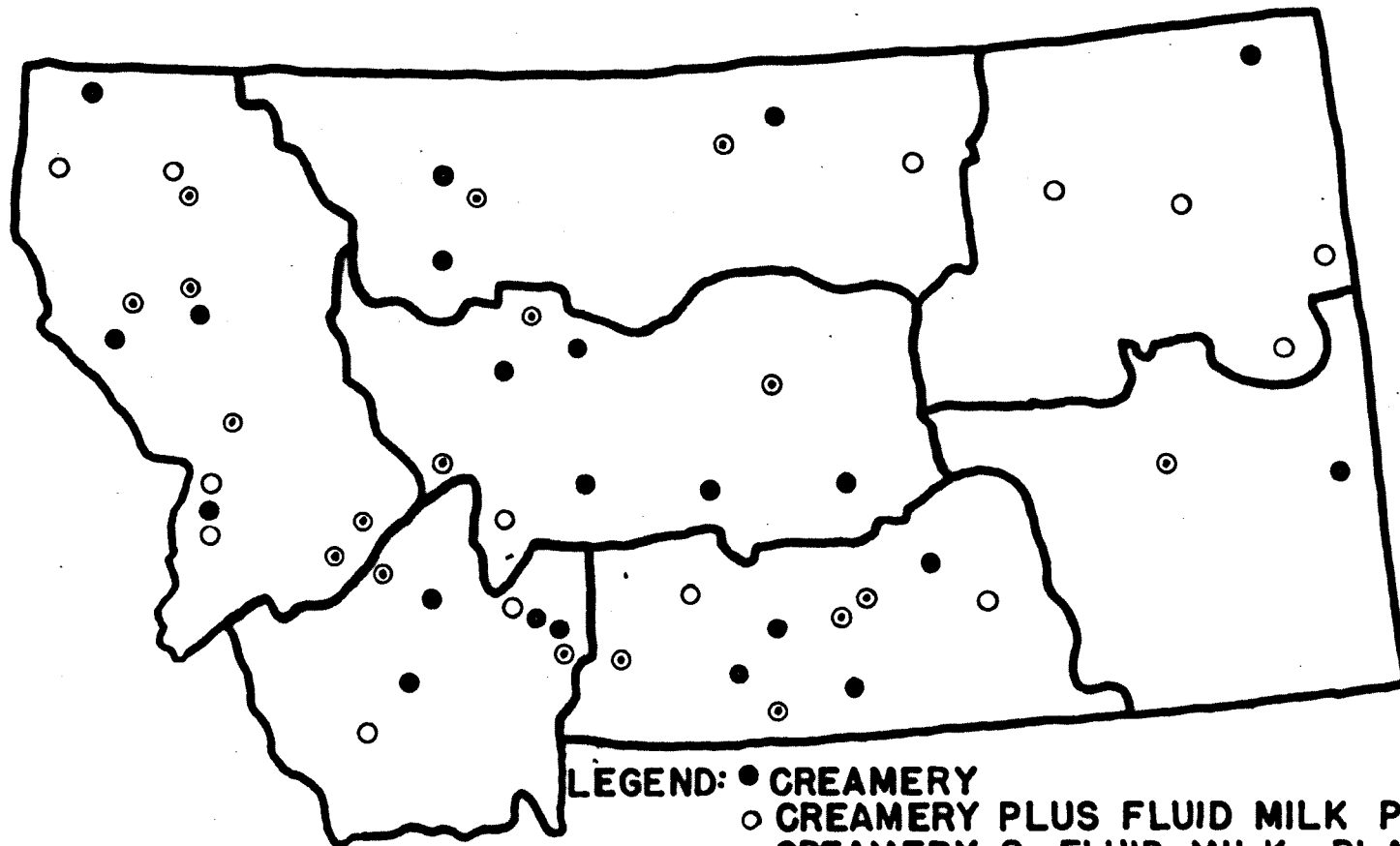
General Characteristics. As in production, processing and distributing plants are concentrated in western Montana, (Figure 4). Milk is a highly perishable product, and because of this, processing facilities must be relatively close to the production area. It may be noted that producers in the eastern sectors are highly dependent on creameries as their marketing outlet. A few of these creameries include fluid milk processing in their operation, but for the most part, fluid sales are made by producer distributors.

In the western districts the producer is offered several alternatives for marketing his product. There are many milk plants demanding grade A milk for fluid distribution; cheese factories and creameries that demand milk for manufacturing; and creameries that demand butterfat for processing.

Every district has the additional alternative of selling farm manufactured butter, but this channel has become of little importance due to

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<sup>18/</sup> See Part IV for a discussion of the "perfect" market concept.



LEGEND: ● CREAMERY  
○ CREAMERY PLUS FLUID MILK PROC.  
⊙ CREAMERY & FLUID MILK PLANT

FIG. 4 LOCATION OF CREAMERIES,  
CHEESE MANUFACTURING PLANTS  
& MILK PLANTS, MONTANA, 1948.

SOURCE: MONT. AGR. STA. 1948.

the inferior quality of such products and consumer reluctance to accept them.

Thus, the producer in the eastern districts is seriously handicapped by the limitations of the market outlet. His alternatives are: 1. To sell his product as butterfat. 2. To process the butterfat and sell farm butter. 3. To become a producer-distributor--alternatives which usually exact a lower net return for the producer and distributor than the whole milk marketing channel. Meanwhile, the consumer receives a product of a decidedly lower quality.

Inter-seasonal and intra-seasonal cross-hauling of dairy products is a common practice in sparsely populated regions. Much of the butter and cheese, which is storable, is shipped out of Montana during the flush season, and during the deficit season shipments must be made into the state. It is apparent that if adequate use were made of storage facilities, considerable savings could be made in the marketing of these products.

Fluid milk shipments have and are being made across surplus areas of the state into deficit areas from far distant surplus areas.<sup>19/</sup> Meanwhile, the near surplus areas have been forced to divert their production to manufacturing purposes.

Cross hauling and loss of desirable markets are primarily a result of: 1. Lack of knowledge among surplus producing areas close at hand as

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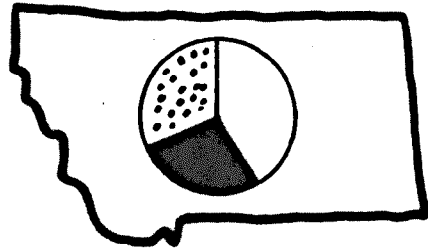
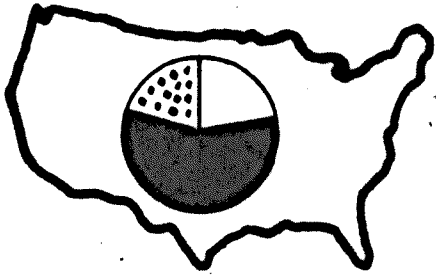
<sup>19/</sup> An excellent example is the Idaho fluid milk shipments to Havre. Here the milk is routed directly through our greatest milk surplus area. These people market their supply as manufacturing milk and receive a lower net return because of it.

to the existence of deficit areas within the region. 2. Unfair and discriminatory freight rates. 3. Inadequate marketing facilities. 4. Lack of organization among distributors and producers. 5. No concerted drive by the producers and distributors of these surplus areas to secure the prevailing market.

Disposition. In Figure 5 we may well see the disposition that has been made of the milk produced. Nowhere in Montana is the national percentage average of wholemilk sales approached. Again the eastern districts are low. A rather rapid increase is noted as progress is made westward.

"Is it desirable for us in Montana to use the percentage disposition of the production in the United States as a guide in reaching the optimum?" To determine the "best" disposition in any area is a subject for much research. Production costs for each type of product must be considered; available transportation facilities would be of utmost importance; size of production and distribution units would have a direct effect; a study of imports and exports of dairy products would be imperative. In short, the comparative advantage, not only between dairying and other enterprises, but between products within the dairy enterprise, must be determined if an optimum disposition were to be made.

The most significant fact revealed in Figure 5 is the high proportion of farms selling no product in the plains region. Herds, save for a very limited number of commercial herds, are only large enough to care for the immediate needs of the family. To equate production units to these needs is an impossible task and a surplus becomes inevitable. This surplus is



LEGEND



CREAM & BUTTER



USED ON FARMS



WHOLE MILK

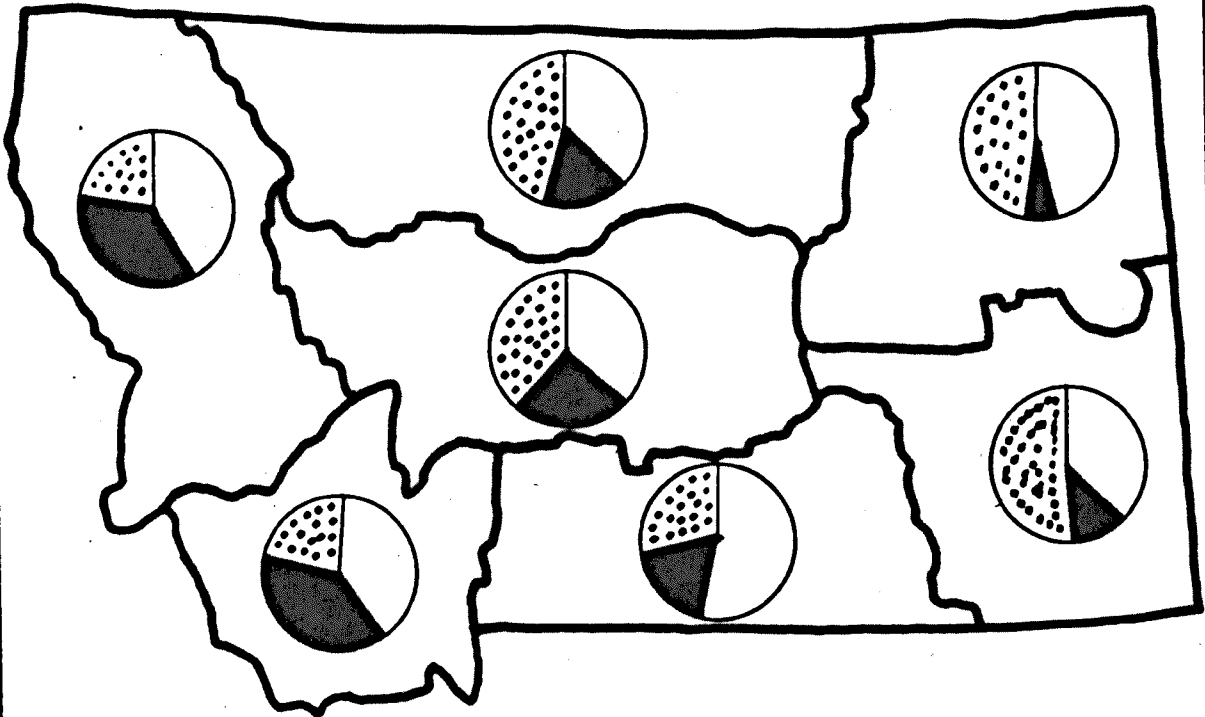


FIG. 5 DISPOSITION OF MILK  
PRODUCED, UNITED STATES  
MONTANA & CROP  
REPORTING DISTRICTS  
1944.

SOURCE: APPENDIX TABLE III

disposed of as livestock feed; where this alternative is not available (very common in the grain producing region), a direct waste of the product results.

Consumers in such an area, dependent on a single producer and distributor of milk, have little security in their source of supply. Likewise distributors in these areas are operating at a decided disadvantage. Volume is low, costs invariably high, supply unstable, and ready capital to meet undue emergencies is often unobtainable. As a result, firms in operation have been forced to liquidate. Perhaps in many cases the consumer was fortunate; he has been suffering from lack of services, an inferior product, and instability at all times. It is only through such a process that public attention is drawn to the problem--the medium from whence corrective measures must arise.

One further comment should be made concerning Figure 5. An important consideration to be made in planning for an increased consumption within an area is the available source of this supply. Upon immediate observation one may be led to believe that a great potential for increasing whole milk sales lies within the eastern districts. At present, only a small percent of the supply is sold in this manner. In the western districts a high percentage is sold via the whole milk channel. Percentagewise, the eastern districts have much further to travel--a higher percentage increase is possible.

Two major shortcomings of such an analysis are apparent. First, the total production of each district has not been considered. Based on the 1944 production figures, a 10 per cent increase in the northwestern

district is equal in quantity to a 25 per cent increase in the northeastern district. Secondly, any increase in whole milk sales would, by necessity, be forthcoming from farms selling cream and butter. In this respect, no great percentage difference is noted among districts. Thus the west, because of its larger overall production, has a far greater potential for increasing whole milk sales.

It must be understood that many further considerations would be necessary to determine the most feasible source for increasing whole milk sales. Available market outlets, concentration and organization, freight rates, roads, and unit costs are only a few of the many related problems in the determination of this problem. Some have been discussed, others will be hit upon later in the text. The primary objective of elaborating upon Figure 5 at this point was to clear the reader of any misinterpretations he may have made.

Seasonality. We have previously discussed seasonality in production. The results of such a practice was omitted from analysis until now. This was not because seasonality was not thought an important production problem, it is simply because the effects of such a practice are more clearly revealed by an analysis of manufactured dairy products. Likewise, the incentive stimulus to correct seasonality must be founded in middlemen's buying practices.

As was earlier pointed out, production ranged from a low of 36 million pounds in December to a high of 72 million pounds in June of 1948, varying from a low of 76 per cent to a high of 141 per cent of the year's mean production.



The fluctuation is still greater in manufactured dairy products, the extreme example being cheddar cheese production. Here production ranged from 57 per cent to 170 per cent of the year's mean production. Butter--the primary manufactured dairy product in Montana--fluctuated from 64 per cent to 161 per cent, (Figure 6).

Fluid milk processing figures are not shown. However, it is known from observation that fluid milk sales are relatively constant throughout the year. This, in part, accounts for the smaller degree of fluctuation in milk produced. One further, yet related, reason for the greater fluctuation in manufactured products is that no buying plan has been initiated by buyers of manufacturing milk to provide an incentive for a change of production plans. The seasonal price changes are a direct result of the forces of supply and demand, apparently an inadequate mechanism for effecting the optimum production and processing plan. However, it may be well to point out that available evidence indicates that manufacturing milk producers have paid little, if any, heed to these price changes and, as a consequence, have made no production changes.

Fluid milk producers are more typical of good dairy husbandmen. Dairying is their major enterprise and they devote more attention to carrying out an efficient operation. They also have been encouraged in a few areas to change their production pattern by seasonal buying plans.

However, even here production practices are far from adequate. In an informal discussion with Mr. Klemme, the Executive Secretary of the Montana Milk Control Board, he stated, "The surplus problem causes more

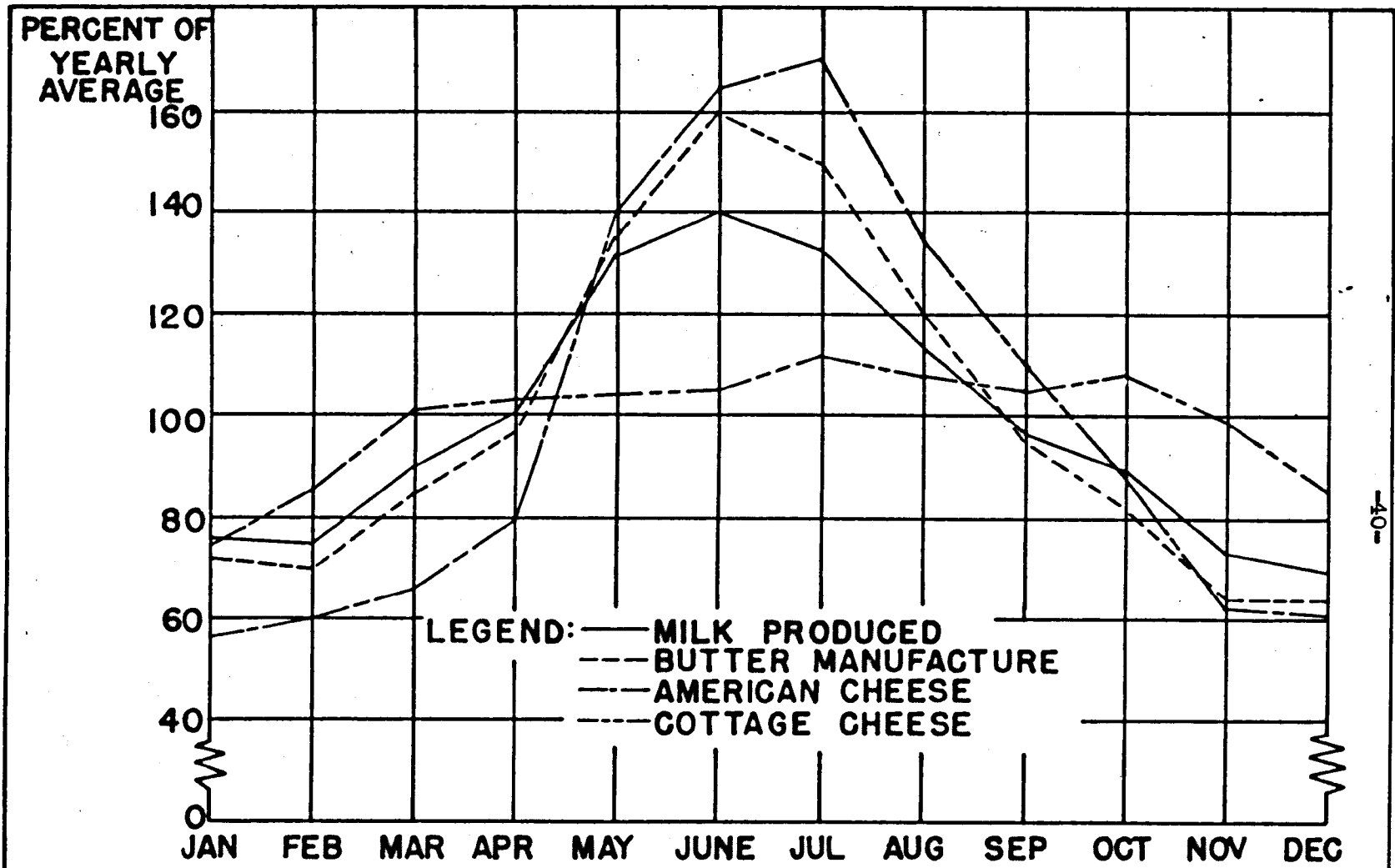


FIG. 6 SEASONAL FLUCTUATION IN THE PROD. OF MILK AND THE MANUFACTURE OF SELECTED DAIRY PRODUCTS, MONTANA, 1948.

SOURCE: APPENDIX TABLE II

trouble in pricing; production, and distribution than anything else." It is needless to say that a much greater stimulus must be provided to remove this surplus problem.

Under economic analysis of perfect competition we assume that the entrepreneur's primary objective is that of maximizing returns of all resources used. This results in "full" efficiency and gives the consumer a product at the lowest possible cost.

In dairying, as in other industries where external production forces cannot be controlled, a conflict arises between the producer and the middleman as to the point of most efficient operation. The producer of milk, to achieve maximum efficiency, would produce with that pattern of "seasonality" which would yield the greatest net revenue to the farm, i.e., where the net revenue was greatest for the entire year's production. Thus, under usual milk pricing practices, production tends to be concentrated at the season of lowest production costs. If storage were impossible and the forces of supply and demand were truly reflective of production and consumption, the "cost-revenue" margin would be equal at all times in long-run equilibrium. However, in manufactured products storage is feasible. This places the processed product in direct competition with the raw product and tends to stabilize seasonal price and accentuate the most favorable "cost-revenue" margin to the season of low production costs.

A similar result has occurred in the production of fluid milk through a somewhat dissimilar process. Before price regulation was initiated, the

price paid for fluid milk was usually set at a constant premium above the market milk price. In many cases no differential at all existed. Today, under the "negotiated" fluid milk price system, competitiveness has been removed from the market and a uniform yearly price has resulted. A wide differential between the fluid milk price and the market milk price is present in all market places. Here again it would be good economics for the producer to concentrate his production to the season of low production costs. This is one of the fundamental weaknesses of our present pricing policy and must be changed if our system of regulated prices is to be continued.<sup>20/</sup>

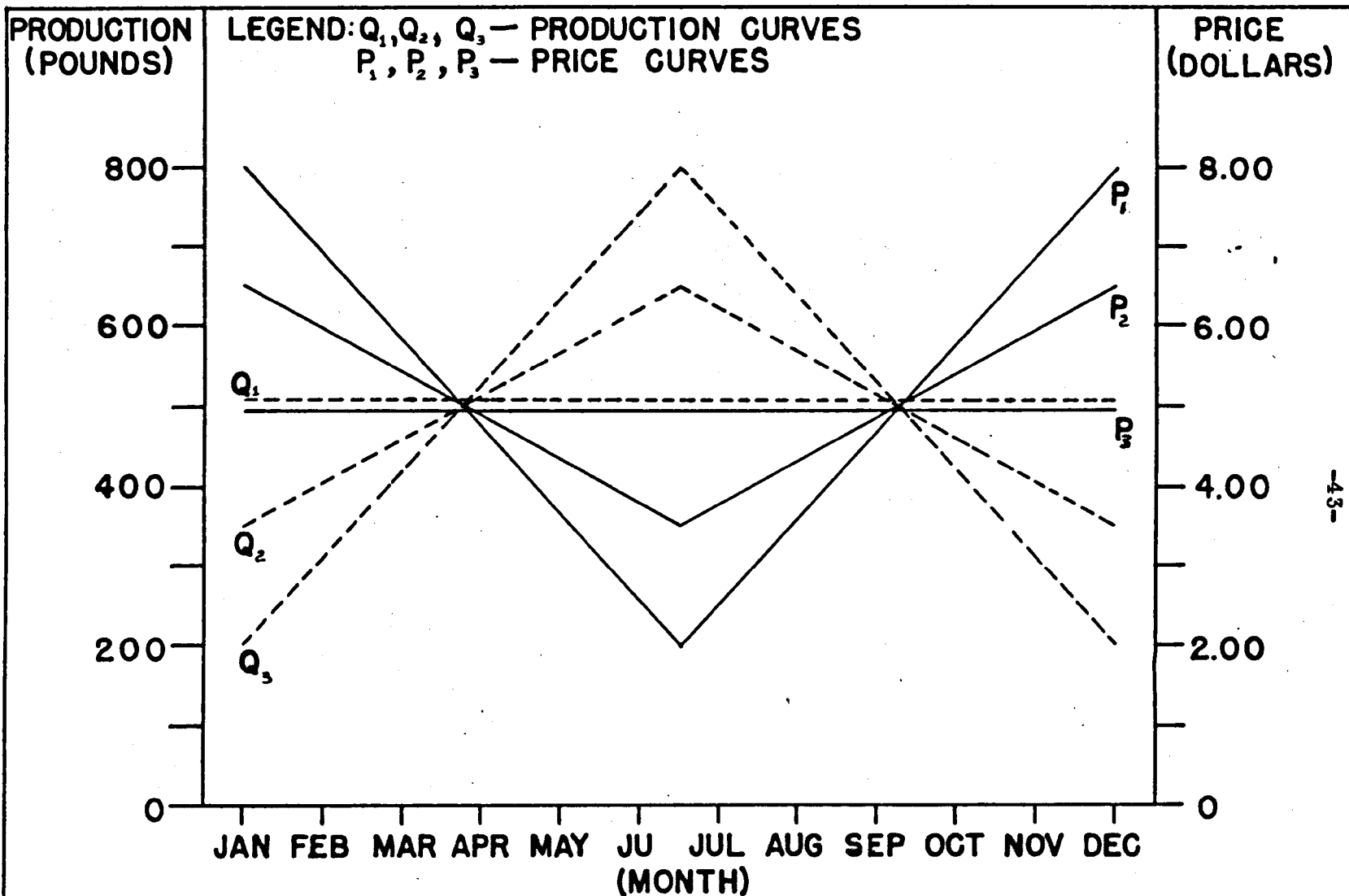
Under "laissez-faire" the producer would have a degree of seasonality in production if he were maximizing returns, though certainly not as great as that shown in Figure 6.

The processor and distributor, like the producer, are also interested in maximizing their returns. They again use the "cost-revenue" margin as the guiding hand. As previously stated, if there were no storage and the forces of supply and demand were truly indicative of the market, the "cost-revenue" margin would be equal at all times and no conflict would exist between firms within the dairy industry.

Under constant cost and constant selling price conditions the processor and distributor would be desirous of operating at a constant daily

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<sup>20/</sup> See Figure 7 for an illustration of hypothetical price and production curves.



**FIG. 7 HYPOTHETICAL COST & PRODUCTION CURVES\***

\* PROD. & PRICE CURVES ARE PAIRED. TO OBTAIN A  $Q_1$  PROD. CURVE, A  $P_1$  PRICE CURVE WOULD BE USED, FOR  $Q_2$  PROD. CURVE, USE  $P_2$  PRICE CURVE, ETC.

output. Plant equipment, if of optimum size, would be operating at optimum capacity at all times and resource idleness would be eliminated.

These conditions may be well met in those industries enjoying a constant supply of the raw product. The processor and distributor of dairy products are dependent on the milk producer for their raw product--a supplier who would not maximize his returns under constant selling price if he were to produce a constant supply.

Thus, there is a characteristic inherent in the milk industry that will not allow absolute efficiency of resource use at the lowest per unit cost for storables. To achieve maximum efficiency and minimize cost for storable dairy products (assuming constant demand) it is necessary to institute price premiums that will reflect the most efficient combined operation of all firms in the industry. An operation producing the finished product at the lowest possible per unit cost, but not at the optimum capacity of each firm in the industry.

Fluid milk, a non-storable, could not be subjected to such a method. Here a relatively constant supply is necessary. Higher seasonal premiums would be necessary to provide suppliers an incentive for stable production; an operation that could achieve absolute efficiency but necessitating "guided" action and at a higher per unit cost than if no external production forces were prevalent.

Two distinct policies appear most feasible to achieve maximum efficiency in a planned economy for dairying--one to be used for storables and the other used for non-storables.

Method of Buying. Milk processors and distributors in Montana are following buying practices long ago outmoded. Eleven of thirty-four distributors included in a cost-of-distribution survey, who bought some or all of their product, purchased their supply by the gallon.<sup>21/</sup> The inaccuracies of this system and the resulting unfairness both to the distributor and producer have been acknowledged in dairy circles. Weighing the milk has been recognized as the more accurate means of determining the actual quantity.

Of the remaining 23 cooperators, 20 used the straight fat method of payment, two used a standard milk price with a differential per point of fat, and one purchased milk by the hundredweight.

Objections to the straight fat method of payment are: 1. It does not take into consideration the other milk constituents, and 2. It does not equitably compensate the producers for the extra care involved in producing milk in compliance with sanitary regulations.<sup>22/</sup>

The standard milk price with differential per point of fat is by far the most advanced of any buying method used by the cooperating distributors. It is essentially a method whereby a flat rate per hundredweight is paid for the milk and a sliding scale differential is used for buying of the butterfat. The differential should be in harmony with the value of butterfat in the form of sweet cream. If the differential is set much below this point, it will encourage the producer to cull his high-testing

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<sup>21/</sup> Korzan, op. cit.

<sup>22/</sup> Sommer, Hugo H., Market Milk and Related Products, p. 250.

cows, or to separate out some of the fat from the milk. If the differential is set much above the market value of butterfat in the form of cream or butter, the milk distributor would lose money on high-test milk, as he would not be able to dispose of the extra butterfat except in the form of cream or butter.

The standard milk is usually of the same butterfat content as that bottled. If this coincides exactly with the weighted average test of all the milk received the distributor will neither lose nor gain by an inequitable differential. If this be the case, the distributor often does not exercise the care that is needed in determining what is an equitable differential. This shortcoming could well be eliminated by one of two methods. Regulatory boards could set or supervise the setting of the differential and an educational program could be initiated to inform all producers of the mechanics of such a buying system which would enable them to determine any inequity. If inequities were present producers could demand a change of the differential used.

Its virtues--the elimination of the objections to the straight fat method--are certainly worth retaining. It does compensate the producer for solids not fat and also for the extra care that is necessary for the larger volume of milk handled by low test producers. Perhaps, a technique as simple as the Babcock test for fat will be developed within the near future for solids not fat, although at the present time this appears highly unlikely. Until then the standard milk price with differential per point of fat certainly warrants use.



The remaining method of purchasing milk in Montana, buying by the hundredweight of milk, is nearly as obsolete as the straight gallon method. It does eliminate the inaccuracies in size of containers, but it makes no allowances for differences in fat content. Thus, it may be likened to the straight fat method of purchase but even more inequitable. The butterfat is of greater value and of much smaller quantity than the other constituents. Hence, a small discrepancy in butterfat exacts a much greater inequity. This system is of little concern in Montana for its use is very limited.

Transportation. Transportation is the "backbone" of our marketing economy and were it not for our many advancements in the field of transportation we would still be living in an age of self-sufficiency rather than one of specialization and the role of a marketing economist would be relatively unimportant.

Three major characteristics are important to the study of any problem in transportation; the facilities themselves, number and concentration of the users, and the rates therein applied. Some people may argue that the latter is merely a result of the previous two. However, anyone familiar with the term "discriminatory freight rates"<sup>23/</sup> is aware that this syllogism has become extinct in areas of sparse population.

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<sup>23/</sup> A discriminatory freight rate is one in which distance and actual hauling costs are equal between areas, but the rates therein applied are in the favor of one of the parties concerned.

A later analysis will be made of steps that should be taken to remove the inadequacies of our present transportation system. It is the express purpose at this time to briefly describe the existing situation so that the "picture" of the dairy industry in Montana can be completed.

Concerning the first characteristic, the facilities themselves, Montana is far behind in the usage of the latest technological advancements made in the field of milk transportation. Bulk milk is still shipped in 10-gallon cans via unrefrigerated baggage cars. Service is slow, often delayed for hours, and costly, definitely an unexpeditious method of movement.

The use of trucks for quantity shipments of fluid milk among distributors has been limited. But they are becoming increasingly important. To quote again the executive secretary of the Montana Milk Control Board, he states, "Refrigerated truck transportation plus the use of the paper bottle has revolutionized the milk industry of Montana, creating havoc in small local markets with the pricing system, distributor, and producer."

Transportation facilities for home delivery service by distributors range from poor to excellent. In most urban markets of the state, home delivery facilities are good and excellent service is rendered at a cost comparable to the large urban centers of the United States.<sup>24/</sup> The smaller markets (rural non-farm) often have no service, and in many markets which do, the cost is excessive and service should be discontinued.

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<sup>24/</sup> The United States Census of Population classifies all cities and towns having a population of 2500 or over as urban, all other rural non-farm.

Exclusive store purchase appears the most feasible method of distribution in these markets.

Facilities for movement of the raw product from farm to plant are inadequate in most areas. Refrigerated trucks are rarely used even on long route, fluid milk pickups.

A typical operation was recently observed. Here the fluid milk producers were concentrated within a small area approximately twenty-five miles distant from a relatively large Montana market. Their production constituted the major portion of the fluid supply for this market. Pickup service was provided by an individual trucker. The equipment used was a stake-bodied truck, and producers stated that rarely, if ever, was a tarpaulin used for cover. As a result, the milk was subjected to the hot sun in summer and intense cold in the winter.

After traveling thirty or forty miles, the milk often reached the plant frozen or extremely warm; a condition ideal for quality deterioration. Quality deterioration was further augmented by the jostling over rough country roads, surely an unhappy ending for a product that had received intense care in production.

In the sparsely populated areas where dairying is not concentrated, the sight of the "family cream can" is familiar. Ordinarily all patrons of the given creamery haul their own butterfat. Often the fat is collected for days on end to obtain sufficient quantity for shipment. Much of this fat is shipped great distances, either by the producer or by local cream buying stations. When the product reaches the processing plant it is of a very low quality. Quality regulations should be enforced to

discourage the marketing of such a product. The producers would turn to more profitable alternatives and the consumer would not be faced with the buying of an inferior product, often disguised by fancy wrappings and bows.

To sum up this discussion of transportation facilities, it can well be stated that no perplexing problem would be encountered in securing adequate facilities were the demand great enough. Our problem is one of properly channeling the product so that a demand will be "cultivated" for these services and eliminate those that are undesirable. This would mean a reduction in production in "high-cost" areas and an increased production in "low-cost" areas. Transportation would be the connecting link--a primary medium for increasing specialization.

Summary. The major problems confronting the processor and distributor in Montana are not those within the internal workings of his plant. Far greater emphasis must be placed upon the development of coordination among all firms. Buying plans for the producer to remove seasonality should be instituted; more and better information as to the desirable utilization of the production must be provided; distributors should work together more harmoniously to avoid cross-hauling and loss of markets; and a cooperative effort by all segments of the dairy industry should be made to secure equitable freight rates and good transportation facilities.

These are only a few of the necessary steps to achieve an efficient milk marketing system. In the past, research has been designed to improve the efficiency of the firm. It is suggested that future research should be designed to improve the system as a whole.

Consumption

All too often consumer interest and influence has been lacking in the milk industry. Distributors and producers are the dominating influence within the market. Prices, services, and quality are usually not end products of consumer tastes and preferences; they are end products of competition, collaboration, and ignorance of the "firms." If consumers were completely rational and aggressive in their purchases, their tastes and preferences would be reflected in what they want and buy. But because they are lethargic and passive, many "unwanted" products and services are received.

Consumer information is limited for dairy products in Montana. Only one publicly-supported project has been completed and should provide an excellent foundation for further consumer research.<sup>25/</sup> Consumer tastes and preferences must be discovered. Too many retailers feel that they know what their patrons want and do not apply any effort in seeking out their "true" desires. Because of the excessive cost and the necessity of hiring skilled personnel in conducting a consumer research study, it is more feasible to do the job through our public institutions. Most consumer studies can be conducted on a national or regional basis through cooperative effort and thus distribute the cost over a larger body and secure a wider range of information.

General Characteristics. In 1947 the average per capita consumption of fluid milk in the United States was 400 pounds.<sup>26/</sup> In Montana the

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<sup>25/</sup> Korzan, op. cit., p. 10-15.

<sup>26/</sup> Computations based on U.S.D.A., Agricultural Statistics, 1948, p. 415.

average per capita consumption of fluid milk for 1947 was 489 pounds, if all milk sold were used for fluid purposes.<sup>27/</sup> This, of course, is not true, but there is reason to believe that the average is considerably higher in Montana than in the United States as a whole. This is because, 1. Montana has a larger percentage of its population on the farm, 2. Montana is a surplus area for dairy production, and 3. Montana has a relatively high per capita income.

A wide variance may be noted in the available supply of milk per capita between farm and non-farm people and among districts in Montana, (Table V). Nowhere is there a shortage in the supply to the farm people. However, in several districts, an acute shortage exists in supply to the non-farm population. The available supply of fluid milk to all non-farm residents in Montana approximates one pint per day, a bare, minimum, nutritional standard.

The consumption of cheese, butter, and other storable dairy products does not follow the same consumption pattern as that of fluid milk and ice cream. These products can and are being made available to the consumer at a reasonable price by our present marketing system. Expeditious movement is a much simpler task and their distribution has proven to be of much lesser concern; more important is the improvement in quality of these products.

Service. As in previous comparisons, the western districts again are playing the favorite role. Of 18 distributors interviewed for a cost

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<sup>27/</sup> Ibid.

Table V. Production Per Capita,  
 Available Supply Per Farm and Non-Farm People,  
 and Percent of Total Population, By District, Montana, 1944.

District	Production Per Capita (Gals.)	Available Supply Per Farm Capita (Gals.)	Percent of Population	Available Supply Per Non-Farm Capita (Gals.)	Percent of Population
1	170	119	30	87	70
2	130	134	44	35	56
3	124	119	46	18	54
4	98	166	22	29	78
5	102	146	15	46	85
6	137	115	35	34	65
7	134	157	45	28	55
Mont.	129	132	31	46	69

Source: U.S. Agriculture Census, 1945.

of distribution survey, only two small producer-distributors failed to pasteurize their product.<sup>28/</sup> Likewise, homogenized milk was available in nearly all urban and rural non-farm markets of these same districts; and the use of approved caps, paper bottles, and square glass bottles were extensive.

In the eastern portion many urban and most rural non-farm markets failed to receive pasteurized milk. Homogenization was unheard of, and the paper and square glass bottles, for the most part, were non-existent. The use of the round bottle and unapproved cap was common practice. Of three distributors interviewed in the two eastern districts, only one rendered services comparable to those in the western sector. This sample is far too small to draw any valid inferences, but it does indicate the situation. It is quite likely this ratio is too low. A figure of five to one would perhaps be much closer to reality.

Delivery service has previously been discussed. However, it may be well to re-emphasize one point in this connection. If efforts were diverted to supplying the rural non-farms and small urban markets of Montana, especially in the plains region, services of the type just discussed, rather than being concerned with doorstep delivery, a distinct service will have been rendered to these people.

Conclusion. In conclusion one significant fact seems to divide the sparsely populated regions from all others in the United States. To each and all who have studied consumer demand and consumption of dairy products,

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<sup>28/</sup> Information secured from cost of distribution schedules. See footnote 5.



consumer income is of greatest concern and is usually regarded as the limiting factor toward increasing consumption. In the plains area of Montana, consumer income, though important, is not the ranking restrictive factor to increasing consumption--the shortage of a high-quality milk supply is!

PART III. REGULATION IN THE DAIRY INDUSTRY IN MONTANA

Introduction

Enumerable types of regulation have found their place in our present day economy. Notable examples in the milk industry are, 1. Federal and state regulation of milk prices, 2. Regulation of quality and adulteration, 3. Anti-trust regulation, 4. Labor regulation, and 5. War-time regulation.<sup>29/</sup> This study is concerned only with the regulation of price and quality. These are not peculiar to the milk industry, but their manifestations have been greater and more closely related here than in other industries. Furthermore, they are of much greater concern in the dairy industry at the present time.

Laws regulating the sale of milk have long been with us. The first was born in Massachusetts in the 1850's.<sup>30/</sup> It was an act prohibiting the adulteration of milk. This was followed by similar acts in other states and cities and soon led to the development of regulation of sanitation and protection of public health. Today practically all the larger cities and many of the smaller cities have a program of quality requirements for milk.

"The greatest need for more sanitary regulations is found in our small towns and villages where milk frequently is subjected to little, if any, regulation of quality. As consumers in these smaller localities become more familiar with the dangers of using milk not under sanitary regulation, they will probably take measures to safeguard the production and sale of this product."<sup>31/</sup>

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<sup>29/</sup> Bartlett, op. cit., p. 47.

<sup>30/</sup> Cladakis, N. J., The Federal Milk Order in Chicago, pp. 12-16.

<sup>31/</sup> Bartlett, op. cit., p. 79.

This quote well summarizes the situation in Montana, but the initiation of sanitation measures in local production, or the securing of a quality supply from other sources by these minorities is not as easy as implied.

The control of fluid milk prices was, no doubt, a result of the economic chaos of the 1930's. The clamor for higher producer prices, stoppage of cutthroat trade practices, and governmental "do something" echoed through the legislative halls. Twenty-six Federal markets and twenty-six state control measures were set up during the period 1933-1940. Today only sixteen states have milk control measures, whereas Federally regulated markets have been on the increase.

Technological advances, changes in our social institutions, and relatively favorable economic conditions have created pressing demands upon our regulatory boards. Thus it is particularly pertinent at the present time to become acquainted with the history and purpose of these regulatory acts. This will aid in the discovery of a basis, by which they may be properly continued in the future.

#### Montana Milk Control Board

General Powers and Duties. The act creating a state milk control board to supervise and regulate the fluid milk industry in the state of Montana was enacted by the Twenty-Sixth Legislative Assembly. The general purpose of the act 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 the state."<sup>32/</sup>

Further insight as to the reasons for creation may be found in the declaration of policy where it is declared:

- (a) That milk is a necessary article of food for human consumption;
- (b) That the production and maintenance of an adequate supply of healthful milk of proper chemical and physical content, free from contamination, is vital to the public health and welfare;
- (c) That the production, transportation, processing, storage, distribution and sale of milk, in the state of Montana, is an industry affecting the public health and interest;
- (d) That unfair, unjust, destructive and demoralizing trade practices have been and are now being carried on in the production, transportation, constitute a constant menace to the health and welfare of the inhabitants of this State and tend to undermine the sanitary regulations and standards of content and purity of milk;
- (e) That health regulations alone are insufficient to prevent disturbances in the milk industry and to safeguard the consuming public from further inadequacy of a supply of this necessary commodity;
- (f) That it is the policy of this State to promote, foster and encourage the intelligent production and orderly marketing of fluid milk and cream; to eliminate speculation and waste, and to make the distribution thereof between the producer and consumer as direct as can be efficiently and economically done, and to stabilize the marketing of such commodities;
- (g) That investigations have revealed and experience has shown that, due to the nature of milk and the conditions surrounding the production and marketing of milk, and due to the vital importance of milk to the health and well being of the citizens of this State, it is necessary to invoke the police powers of the State to provide a constant supervision and regulation of the milk industry of the State to prevent the occurrence and recurrence of those unfair, unjust, destructive, demoralizing and chaotic conditions and trade practices

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<sup>32/</sup> Laws of Montana, Twenty-Sixth Session, 1939, Chap. 204, p. 515.

with the industry, which have in the past affected the industry and which constantly threaten to be revived with the industry and to disrupt or destroy an adequate supply of pure and wholesome milk to the consuming public and to the citizens of this State;

(h) That fluid milk is a perishable commodity, which is easily contaminated with harmful bacteria, which cannot be stored for any great length of time, which must be produced and distributed fresh daily, and the supply of which cannot be regulated from day to day, but, due to natural and seasonal conditions must be produced on a constantly uniform and even basis;

(i) That the demand for this perishable commodity fluctuates from day to day and from time to time making it necessary that the producers and distributors shall produce and carry on hand a surplus of milk in order to guarantee and insure to the consuming public an adequate supply at all time, which surplus must of necessity be converted into by-products of milk a great expense and oftentimes at a loss to the producer and distributor;

(j) That this surplus of milk, though necessary and unavoidable, unless regulated, tends to undermine and destroy the fluid milk industry, which causes producers to relax their diligence in complying with the provisions of the health authorities and oftentimes to produce the milk of an inferior and unsanitary quality;

(k) That investigation and experience have further shown that, due to the nature of milk and the conditions surrounding its production and marketing, unless the producers, distributors, and others engaged in the marketing of milk are guaranteed and insured a reasonable profit on milk, both the supply and quality of milk is affected to the detriment of, and against the best interest of the citizens of this State whose health and well-being is thereby vitally affected;

(l) That, where no supervision and regulation is provided for the orderly and profitable marketing of milk, past experience has shown that the credit status of both producers and distributors of milk is adversely affected to a serious degree thereby entailing loss and hardship upon all within the community with whom these producers and distributors carry on business relations;

(m) That, due to the nature of milk and conditions surrounding its production and distribution the natural law of supply and demand has been found inadequate to protect the industry in this and other states, and in the public interest it is necessary to provide state supervision and regulation of the fluid milk industry in this State. 33/

The members of the board consist of the executive officer of the Montana Livestock Sanitary Board, who serves as chairman, and four appointees of the governor having the following qualifications: One person shall be a consumer who is not engaged in the dairy industry and a producer, producer-distributor, and distributor from the dairy industry. Appointees from the industry shall be selected only from markets established by the board.<sup>34/</sup>

It shall be the duty of the board, ". . . to designate an executive secretary who shall serve under the direction and at the pleasure of the board and who shall have charge of the administration of the board's orders, rules and regulations, and who shall serve as financial officer of the board . . ."<sup>35/</sup>

The general powers of the board are:

". . . it shall be its duty to supervise, regulate and control the fluid milk industry of the State of Montana, including the production, transportation, processing, storage, distribution and sale of milk in the State of Montana for consumption within the state, . . ., but the board shall have the power to cooperate with the State Board of Health, the Montana Livestock Sanitary Board or any county or city board of health or the State Department of Agriculture, Labor and Industries in enforcing the provisions of this act. The board shall have the power to investigate all matters pertaining to the production, transportation, processing, storage, distribution and sale of milk in the State of Montana and to conduct hearing upon any subject pertinent to the administration of this act. The board shall have the power to subpoena milk dealers, their records . . . and any other person . . . to carry out intent of this act . . . The board may act as mediator or arbitrator to settle any controversy or issue pertaining to fluid milk . . ."<sup>36/</sup>

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<sup>34/</sup> Ibid, p. 516.

<sup>35/</sup> Ibid.

<sup>36/</sup> Ibid. pp. 517-518.

Markets. Provisions as to the range of authority in the establishment and disestablishment of market areas are given:

"The board shall exercise its powers only within and in relation to markets already designated and established or such markets as shall be established in accordance with the provisions of this act.

"The board shall have power, at its discretion, to establish a new market in any natural marketing area of the State that it may designate, provided ... a canvass shall be made by the board, of all producers, producer-distributors, and distributors doing business within the designated market and who are licensed by the Montana Livestock Sanitary Board ..., shall make it evident to the board that a majority of the fluid milk sold ... are in favor of the establishment of such proposed market ..."<sup>37/</sup>

The disestablishment of any market area under the jurisdiction of the board is subject to the same laws and procedures as in the establishment of a market. Absolvment cannot be made unless a majority of all dealers representing a majority of the fluid milk sold are in favor of disestablishment.<sup>38/</sup>

Price Fixing. Orders for fixing prices and handling charges are laid down as:

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

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<sup>37/</sup> Ibid. pp. 518-519.

<sup>38/</sup> Ibid. p. 520.

"The board shall take into consideration the balance between production and consumption of milk, the costs of production and distribution, and the purchasing power of the public."

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 ...

(b) The minimum wholesale or retail prices to be charged for milk in its various grades and uses ... wheresoever produced ... A minimum wholesale or retail price to be charged for milk shall not be fixed higher than is necessary to cover the costs of ordinarily efficient and economical milk dealers, including a reasonable return upon necessary investment. The board may, upon its own motion, or upon application in writing from any market, or from any party at interest, alter, revise or amend any official order theretofore made by the board provided ... the board shall hold a public hearing on such matter in the same manner provided herein for the original fixing of prices. The retail price to be charged for milk in quart bottles shall not be more than twice the price paid by the distributor to the producer ...<sup>39/</sup>

Additional Duties, Requirements, and Remedies. All producers, producer-distributors, and distributors must be duly licensed as provided by this act to produce, transport, process, store, handle, distribute, buy or sell milk in any market where the provisions of this act apply. The board may decline to grant, suspend or revoke a license to any party in violation of this provision.<sup>40/</sup>

In addition the general and special powers heretofore set forth, the board shall have the power to make and formulate, in any established

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<sup>39/</sup> Ibid. pp. 520-521.

<sup>40/</sup> Ibid. p. 521.



market, reasonable rules and regulations governing fair trade practices as they pertain to the transaction of business among licensees under this act within that market.<sup>41/</sup>

The board, or any person designated for that purpose by the board, shall have access to, and may enter, at all reasonable hours, all places where milk is produced, processed ... and shall have power to inspect and copy same in any place within the State ... Any member or employee of the board ... who shall acquire any information ... and who shall divulge the same to any person other than members of the board, <sup>42/</sup>except when called upon to testify ... shall be guilty of a misdemeanor.<sup>42/</sup>

The board shall have the power to require all persons holding licenses under it to file with the board such reports ... showing such person's production, sale, or distribution of milk, and any information deemed by the board ... and failure or refusal to file such reports when directed... shall constitute grounds for revocation of such person's license ... and may be fined as hereinafter provided ...<sup>43/</sup>

The board shall have power and it shall be the duty of the board to promote and foster in each established market, an association organized under regulations satisfactory to the board and composed of all licensees of the board and designated as the dairymen's association of such market. It shall be the function of such association to promote the mutual interests of its members and of the dairy industry, but its specific function with relation to the board shall be to provide an instrument whereby the licensees within the market may and they shall unitedly cooperate with and be of assistance to the board in determination, assembling and presentation of facts and findings relative to the costs of production, costs of distribution, and other factors upon which price schedules shall be based, and to otherwise counsel and assist the board as opportunity may afford in carrying out and enforcing the provisions of this act.<sup>44/</sup>

In order to secure a uniform system of milk control, the board is hereby vested with power, and it shall be its duty to confer and cooperate with the legally constituted authorities of other states and the United States ...

The board or its authorized agent may institute such action at law or in equity as may appear necessary to enforce compliance with any provision of this act or to enforce compliance with any order, rule or

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<sup>41/</sup> Ibid, p. 525.

<sup>42/</sup> Ibid. pp. 525-526.

<sup>43/</sup> Ibid. p. 526.

<sup>44/</sup> Ibid. pp. 526-527.

regulation ... or to obtain a judicial interpretation of any of the foregoing, ... All legal actions may be brought by or against the board in the name of the Montana Milk Control Board ... The board shall have the power to institute action by its own attorney or counsellor, ...<sup>45/</sup>

Official Opinions Rendered. The office of the Attorney General was asked in June, 1948 to clarify Official Opinion No. 63, Volume 22. This clarification as given by Attorney General R. V. Bottomly follows:

It is, therefore, my opinion, the Montana Milk Control Board has been authorized by our legislative assembly to fix only the minimum prices to be paid by milk dealers to producers and others for milk and the minimum wholesale or retail prices to be charged for milk in its various grades and uses handled within the state for fluid consumption.<sup>46/</sup>

In May, 1949, the Attorney General was submitted the following questions for his opinion:

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; (See footnote 40, par. (b)).

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<sup>45/</sup> Ibid. pp. 528-530.

<sup>46/</sup> Mimeo. to Mr. A. A. Klemme, Executive Secretary, Montana Milk Control Board from R. V. Bottomly, Attorney General.

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 paid in the market area. It does not mention any procedure for 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.<sup>47/</sup>

General Comments. The Montana Milk Control Board has exercised a real stabilizing influence in our dairy industry, and high praise is voiced by the majority of the fluid milk industry for its work. Price regulation has been the center of its activities. Little concern has been given to changes in technology, methods of improving efficiency of

production and distribution, ways and means of creating and cultivating consumer demand, dissemination of dairy "know-how" to the industry, possible future trends, and the necessary compensating measures to meet these changed conditions. This has not been a result of board member reluctance. They have been limited not only by time, but by funds as well. Maintaining price regulation in some thirty or forty markets is a time-consuming job even during periods of easy operation, as has been experienced during the past decade. Further, only the executive-secretary devotes his full time to these duties. All other members have full time commitments elsewhere and are unable to give their utmost to this cause. The Board should be commended for the job it has done. But there is a real question whether consumer price fixing is all or even the best thing that needs to be done. There is a far greater opportunity for constructive work along other lines. Among the more important would be, 1. The development of a producer buying plan that could and would be inaugurated by our processors to alleviate the surplus problem and yet maintain an ample supply of fluid milk. This problem was widely recognized and referred to in the writing of the law. 2. The board should act in an advisory capacity to their associations and aid them in securing information pertinent to their work. Further a state-wide organization of these associations would be very beneficial in developing the dairy industry. Also, consumer representation should be part of these associations and should be so written in the law. 3. It should be the board's duty to sell the public on milk. This could be ably done through each and every

association in a well developed and coordinated plan. 4. Encourage fluid milk production in "low cost" areas and discourage it in "high cost" areas, and study ways and means of developing marketing techniques that would make the law of "comparative advantage" a reality. Much of this work could be done through the dairy division, which has the authority to function as such by law, and by cooperation with our State College of Agriculture. (This is a present day development that has a promising future.) 5. Abolish the establishment of local market places having a three to twelve-mile radius. The "milk market area" should be state-wide because of improved transportation and bottling facilities. 6. Last, but of most importance, eliminate wholesale and retail price schedules and develop a base-producer schedule or differential. (This will be developed in detail in Part IV of this text.)

Consumer pricing was tried in our Federally controlled markets and discontinued. Ten of our state control boards suspended operations primarily because of this practice, and three of our sixteen states having a milk control measure have eliminated this provision. Three fundamental forces are responsible for this action; 1. Declining price level, 2. Technological advancements, and 3. Social institutional changes.

Today the Montana board is well aware of the effects of technology on its operations having been placed in a verbal "hot seat" by its force. Two recent developments well illustrate the point.

It is common practice in Montana today (a very recent development) to ship milk in cartons from a "low cost" area to a "high cost" area and

yet pay the producers of this milk the price established in the "low cost" area. This is in direct violation of the Milk Control Board law.<sup>48/</sup> Yet, the Milk Control Board does not press for prosecution for it realizes the shortcomings of this law. But they are faced with enforcement if the producers and distributors of these "high cost" areas continue to demand action. The producers are particularly disturbed in these areas, (and rightfully so for they have capitalized their firm to the net returns of these various price schedules,) for they can well visualize an entire loss of these markets. This means producing milk for manufacture, or turn to other enterprises if at all possible.

Several distributors at a recent meeting called by the Milk Control Board concerning this question were violently opposed to the enforcement of the statute referred to. They felt the free play of technology should be encouraged and the law of "comparative advantage" should rule our markets. Sympathy was extended the producers in the "high cost" areas, but they deemed them unfortunates in our spiral of progress. They could see the competitive position of the producer but not of themselves. How little did they realize they were being subsidized by the Milk Control Board in the form of retail price fixing!

This is excellently shown in Table VI when a comparison is made of a recent cost analysis of 42 Montana distributors. It was determined in

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<sup>48/</sup> Refer to footnotes 40 and 48.

Table VI. Milk Control Board Markets, Retail  
and Wholesale Prices, and Distributor Margins. Montana, 1950

Market	Retail Price	Producer Price	Distributor Margin
		(cents per quart)	
Anaconda	20	11.14	8.86
Big Timber	17	9.20	7.80
Bozeman	18	10.10	7.90
Billings	19	10.70	8.30
Boulder-Clancy	20	11.14	8.86
Butte	20	11.14	8.86
Bridger-Fromberg	19	10.34	8.61
Chinook	20	10.75	9.25
Deer Lodge	20	11.14	8.86
Drummond	20	11.14	8.86
Glasgow	20	11.14	8.86
Great Falls	20	11.14	8.86
Harlowton	19	10.70	8.30
Havre	20	10.50	9.50
Hamilton	16	8.00	8.00
Helena	20	11.14	8.86
Kalispell	19	9.90	9.10
Laurel	19	10.70	8.30
Lewistown	16	8.00	8.00
Livingston	18	9.50	8.50
Malta	18	10.00	8.00
Miles City	18	(1/2 selling price)	9.00
Missoula	19	9.90	9.10
Plentywood	20	11.14	8.86
Red Lodge	19	10.34	8.60
Roundup	13	6.50	6.50
Sweet Grass	17	9.20	7.80
West Yellowstone	20	11.14	8.86
Whitefish	19	10.20	8.80
Wolf Point	20	11.14	8.86

Source: Montana Milk Control Board Price Schedules.

of milk must buy his supply. This does not allow the grocer to meet the milk distributor on a competitive basis and places the distributor liable to suit as being in violation of the Unfair Practices Act of the State of Montana where it is stated;

Section 1. It shall be unlawful for any person, firm or corporation, doing business in the State of Montana and engaged in the production, manufacture, distribution or sale of any commodity, or product, or service or output of a service trade, of general use or consumption, or the product or service of any public utility, with the intent to destroy the competition of any regular established dealer ...

Section 3. It shall be unlawful for any person, partnership, firm, ... to sell, offer for sale or advertise for sale any article or product ... at less than the cost thereof to such vendor ... The term "cost" ... as applied to distribution "cost" shall mean the invoice or replacement cost, whichever is lower, of the article, or product to the distributor and vendor plus the cost of doing business by said distributor and vendor.<sup>51/</sup>

Thus, one may readily see that if the grocer selling milk in the Butte market were to be competitive as required by law in Section 1 of this act he would be in violation of Section 3 under the present milk control price schedule.

This case was presented to the board by Mr. Frank, representative for Safeway Stores. He asked only to be placed on a competitive basis with the milk distributors and offered two methods for attaining this goal. The first alternative was to lower the wholesale cost and secondly, remove the retail quantity discounts. He opposed lower producer prices, (this being regarded by the distributors as the ultimate result of lowering wholesale prices. The thought of narrower distributor margins for the distributor was intolerable,) and yet felt the consumers securing

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<sup>51/</sup> Laws of Montana, Twenty-Fifth Session, 1937, Chap. 80.



the larger deliveries were entitled to a lower price. However, he re-emphasized the inequity to the store purchaser who was being penalized two cents per quart on an eight quart purchase at the store. He left the solution to the board, but implied court action would be forthcoming were no action taken.

The distributors, who were represented by counsel, realized the strength of the case and voted unanimously to remove all quantity discounts from each and every control board market. This removed the threat of prosecution, but at the expense of the consumers welfare which was so generously referred to throughout the Milk Control Board Act.

One or two other pricing practices may be well worth mentioning to point up the difficulties of price fixing. "Underhanded" methods have been called into play to circumvent prosecution and yet establish a satisfactory price to the distributors of that market. This has arisen out of the installation of paper equipment. Many distributors have felt that a one cent differential of milk sold in cartons over milk sold in glass is justified and should be included as such in the price schedule. This practice was adopted in some markets of other states having milk control laws, but because the courts declared it unconstitutional to discriminate against types of containers they were forced to eliminate the setting of price differentials on containers. The method used now to secure this differential is by pricing homogenized milk higher than "regular" milk and bottling only homogenized in paper containers. Dr. Nelson, of the Montana State College Dairy Industry Department, has stated that no price

differential is warranted between these milks. The cost of the additional step in processing is compensated for by the removal of a small percent of the fat content of the milk without significantly lowering the quality of the finished product.

The reader may feel we have been over-critical of the board's work and that there is little hope for its survival. On the contrary, a definite need exists for the board. Exception is taken, not to the board members, but to the law itself and the course of action pursued because of it. The greatest contribution this law has made has not been in the establishment of many markets and prices--it has been the organization of our dairy interests on a common ground and it is in the furthering of this ideal that the welfare of the public will best be served.

#### Sanitary Boards

In Montana, the regulation of sanitary standards is administered by two separate and distinct boards. The law in effect reads:

Section 2620.1 Regulation of Dairy Industry. The department of Agriculture, Labor and Industry of the State of Montana, shall have the general regulation of the industry of dairying in this State, including the regulation and sanitary inspection of all creameries, butter and cheese factories, milk and cream receiving stations, and ice cream factories. The sanitary inspection of all dairies, milk plants, condensed milk factories and powdered milk factories shall be administered by the State Livestock Sanitary Board.

Section 2620.2 Enforcement of Standards. The department of Agriculture, Labor and Industry, shall enforce the laws of the State regulating the standards of all dairy products, except whole milk, skimmed milk, condensed and evaporated milk, whether made from whole milk or skimmed milk. The regulation of said standards above excepted shall be the duty of the Livestock Sanitary Board.

Section 2620.3 Statistics and Extension Work. It shall be the duty of the Department of Agriculture, Labor and Industry to compile and publish statistics concerning all phases of the Dairy Industry in the State and to encourage and advertise said industry in every possible manner. Said Department shall carry on a campaign of education in conjunction with the extension work of the College of Agriculture and Mechanic Arts for the purpose of encouraging interest in the dairy industry and of furnishing scientific and practical information concerning the same.<sup>52/</sup>

A summary of the laws governing the actions of these boards follows. One must realize there are many ramifications of these generalizations, but neither time nor space permit a detailed development. Neither is it believed that a "fine-tooth combing" of the law would contribute significantly to this disquisition.

The Montana Livestock Sanitary Board, as stated, is charged with the sanitary inspection of all dairies, milk plants, condensed milk factories and powdered milk factories. The standards for regulation are modeled from those of the United States Bureau of Animal Industry and of other states. They stipulate that milk or cream conforming to the regulations of the board be designated inspected milk or cream. All dairies licensed to produce milk or cream for fluid consumption are to be inspected annually and must score 70 or more points on an official score card approved by the board. Milk plants purchasing milk from dairies scoring less than 70 must pasteurize all such milk before offering it to the consumer and must not mix it with inspected dairy milk.

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<sup>52/</sup> The Montana Law, Regulating Operation of Creameries, Cheese and Ice Cream Factories, Division of Dairying. State Department of Agriculture, 1937.

All fluid milk sold must contain not less than 3.25 per cent butterfat and not less than 8.5 per cent solids not fat. Raw milk shall not contain more than 80,000 bacteria per c.c., and pasteurized milk shall not contain more than 30,000 bacteria per c.c.<sup>53/</sup> Cream sold as whip must contain not less than 30 per cent milk fat and not more than .2 per cent of acid reacting substance calculated in terms of lactic acid. Bacterial count shall not exceed 160,000 bacteria per c.c. for raw cream and 60,000 bacteria per c.c. for pasteurized cream.<sup>54/</sup>

The Livestock Sanitary Board has specific requirements for the production of fluid milk and cream. Among the more important of these are, 1. The barn and milk house should have impervious floors, trap drains, adequate lighting, good ventilation, and fly control. 2. The use of mechanical refrigeration and an aerator of sufficient capacity is recommended. 3. The milk house must be equipped with metal can racks, two stationary vats, and an ample supply of hot water. 4. The well must be properly located and is subjected to a sanitation test before a license is granted.

The costs to meet the sanitation requirements for fluid milk production are substantial, but no producer interviewed felt that they were oppressive. The author advances the hypothesis that the price spread between fluid milk and market milk is wider than is justified to compensate for the added capital equipment and care in handling. However, this would need to be verified through considerable research.

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<sup>53/</sup> Bacteria counts given here are those of Bozeman.

<sup>54/</sup> Allmendinger, Werner, Bozeman Milk and Cream Distribution, p. 21.

The Department of Agriculture, Labor and Industry has rules and regulations ranging from the establishment and operation of the plant to the actual sale of the product. Those of major importance are:

All plants handling market milk must be licensed.

Specifications as to location and construction of all manufacturing and buying plants are given.

Any plant or station may be closed if found to be unsanitary.

All milk or cream used for manufacturing shall be pasteurized.

All milk and cream shall be considered unlawful that is musty, rancid, dirty, or with marked undesirable odors, and shall not be sold, purchased, or used for any food purpose whatsoever.

All cream graders, weighers, and samplers must be licensed.

Daily posting of butterfat prices shall be required.

All dairy products shipped into Montana must be produced under the same sanitary regulations and requirements as those governing the production of the same in this state.

A full report of the amount of all dairy products handled or manufactured shall be submitted to the board monthly.

Grades as well as price must appear in all advertisements of agricultural products where grades have been established by law.

The board does not exercise any jurisdiction over the production of milk.

Our sanitary boards have become well adjusted to our economy--unlike the control boards their probationary period has passed. They have been

accepted by the public and have aided materially in raising our quality standards for dairy products. Further increases in these standards are in prospect. Soon only pasteurized fluid milk and cream will be sold and the regulations for production will no doubt become more severe for both fluid and market milk and cream.

The one major criticism of our sanitary board is the operation of two boards in plant inspection. A far more feasible method of operation would be to restrict the sanitary regulation by the Livestock Sanitary Board to the dairies alone and delegate all other authority pertaining to sanitary regulation to the Department of Agriculture, Labor and Industry. Under our present system it is not uncommon to see two inspectors, one each from our two sanitary boards, in a creamery at the same time. Furthermore, the operator is responsible to two authorities, probably having conflicting requirements. Inspection costs, because of duplication, are higher and it is more difficult to secure harmonious action between our regulatory boards and between these boards and the industry. The transfer of authority would be relatively simple and would be of great benefit to the dairy industry.

PART IV. IMPROVING THE MARKETING SYSTEM

Introduction

In the previous chapters an attempt has been made to describe the dairy industry of Montana. That dairying is an important part of the economy of the state and one deserving of much thought and consideration cannot be questioned. It is the purpose of this chapter to briefly describe what constitutes a utopian market, or perfect market, to the economist and ways and means of approaching it.

The Perfect Market. A market has been defined as a territory over which the same forces of supply and demand are at work on prices.<sup>56/</sup> These are essentially the fundamental characteristics of a perfect market save for one distinguishing feature. That is, "all of the buyers and sellers in the market have perfect knowledge of demand, supply, and prices, and act rationally upon that knowledge. In the simplest case, all the buyers and sellers of a particular commodity are located at a single point in space, and are doing business at a single instant of time."<sup>57/</sup> This definition involves three elements--time, place, and form. In a perfect market a uniform price prevails plus or minus any necessary charges for these services when fundamental supply and demand remain unchanged.

If we were to examine the price surface of this perfect market one would observe a series of "concentric rings" representing "iso-prices"

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<sup>56/</sup> See footnote 17.

<sup>57/</sup> Shepherd, G. S., Agricultural Price Analysis, p. 31.

extending outward from the surplus areas. The symmetry of these "iso-price rings" will be dependent upon: the relative supply and demand for each market place; the number of surplus areas; and the cost of transportation to the market place. One must further realize that these "iso-prices" are dynamic and are in constant change. The rate and sensitivity of change will be dependent upon the knowledge the buyers and sellers have of prices, supply, and demand and the degree of rationality applied.

In the dairy industry response has been slow to meet these changes. This creates a market where the "iso-prices" are not indicative of the supply and demand relationships. A prime factor for this maladjustment is the current pricing policy. Yet, this cannot be the sole reason for many market places do not have these price barriers. If market restriction by price is an inadequate answer for this maladjustment, what is? This question has been mulled for some time and the following points seem to be at least a partial answer to this question. First, we in many cases are comparing prices between regions of unlike commodities. Fluid milk in Bozeman is of a higher quality standard than fluid milk in Ekalaka. Second, because of inertia, the price to create the incentive for extending an "iso-price" outward from a surplus area is necessarily higher than the price required to maintain the "iso-price." Third, the changes wrought by technology and shifts in production areas are recent developments. Fourth, many people are reluctant to make a change though it be advantageous to their welfare. This fact is well substantiated by the slow response to many experiment station bulletins. Fifth, the voice of these



market places is very weak. One dairyman at a recent hearing was heard to remark, "The markets outside the jurisdiction of the control board are insignificant." This is perhaps true when considered individually but under collective observation they are certainly significant and of great importance to the dairy industry. A population analysis of Montana reveals that 28 per cent of our population live in villages having less than 1,500 inhabitants--the segment of our population constituting the major proportion of these "insignificant markets."

These are important considerations to make when studying the possibility of extending a distribution system from a surplus area. All too often only price is considered. Meeting competition on a quality and quantity basis seems more plausible for much of our plains area in Montana.

The perfect market is in reality the law of "comparative advantage" at work. Because of its dynamic status it is nearly impossible to attain complete perfection, but with constant study of market conditions and a willingness to apply the knowledge thus learned one can closely approach perfection.

Of the many problems that our dairy industry is faced with today, that of establishing a sound pricing system is most important. It is quite impossible to design a price policy that will meet the requirements of all market places or the same market place over a span of years. Yet, it is possible to formulate objectives that should be the foundation of any milk price plan. Likewise with a minimum of change they can be made to serve any market over a long period of time. These are: 1. Milk

should be produced in those areas enjoying the greatest "comparative advantage" or the least "comparative disadvantage." Comparative prices between regions must reflect these advantages and disadvantages. 2. It should be designed to assure a sufficient quantity of quality milk at all seasons. 3. Price should be in line with general economic conditions and supply and demand. 4. Price changes should be orderly and timely. 5. A balanced relationship between the prices of fluid milk and manufacturing milk must be maintained. 6. A price formula should not discourage or prevent the adoption of cost-saving practices or technologies. 7. A price formula should be designed to encourage or discourage production and distribution in any area as conditions warrant with a minimum of disruption and suffering.

Various plans and combinations will be reviewed briefly before setting down a specific plan for Montana. These plans are included under two broad classifications--producer pricing, and consumer pricing.

Producer Price Plans. Producer price plans were the first to originate. The fundamental purpose of milk buying plans is to regulate milk production. They must not be confused with buying methods which were referred to in Part II, i.e., buying by the gallon, butterfat, point differential, etc. Any one buying method must be an integral part of any given plan. There are essentially four types of price plans though numerous variations and combinations of these types are prevalent.

1. Classification Plan. In this plan each class of milk is paid for in accordance to its use. A relatively high price is paid for milk sold as fluid, a lower price for milk sold as fluid cream, and for manufacturing milk a still lower price is received. The number of separate classes varies with the scope of the firm. At the end of the period, usually each month, the weighted average or composite price of the milk purchased is determined. This price is then used as the basis for paying each individual producer. The exact price to each would vary with the type of buying method used in accordance to butterfat content and volume of milk delivered. The objection to this plan is that it is unjust to the producer who complies with the seasonal market needs. This removes the incentive to produce during the deficit season and unless the producers are highly cooperative little is accomplished in the way of alleviating the surplus problem.

2. Base Surplus Plan. Under the base surplus plan each producer is compensated for producing a uniform volume of milk throughout the year. Each producer is assigned a base corresponding to his total production during the month or months of lowest production. He may then sell at any time during the year an amount equalling this base at the fluid milk price (Class I). For any production in excess of this base a lower price is paid. The primary fault of this plan is the difficulty of keeping the total base in harmony with the actual sales.

3. The Combination Plan. As the name implies this price plan is simply a combination of the classification plan and the base surplus

plan. Usually where this plan is used the milk is sold to the distributors by the producers' association in accordance with the classification plan. The association then pays the individual producers according to the base surplus plan. This plan gives the producer an incentive to coordinate his production with market demands and allows the distributor to pay for the milk he receives according to the uses he makes of it.

4. Seasonal Differential. Before the advent of milk producers associations, it was common for distributors to pay a composite price for the milk used for fluid purposes and that used in manufacturing. This composite price varied with the season. During months of peak production the composite price was closer to the milk value of manufacturing milk while during the months of low production the composite price approached the price of fluid milk. When producers associations were first organized they became aware of the surplus problem and often used the seasonal differential as a basis for bargaining. The differential fluctuated up and down from the fat value of milk used as butter. It was usually established for a 12-month period and varied from month to month. The amount of the differential was based on the previous years sales and the estimated sales and production for the coming year. The principal objection to this plan is the high risk assumed by the distributor. The contracted price becomes a forward price guaranteed by the distributor and if his forecasts are inaccurate he stands to lose or gain. If the surplus milk should be greatly increased, the contracted prices become burdensome and may lead to financial ruin of the distributor. Thus there is a tendency for the

distributor to underestimate the differential and this does not create the necessary incentive to encourage the production of a uniform supply of milk. Also, like the classification plan, no individual incentive is created. All producers receive the same price for their production. Its main virtue is the ease of operation. In those producing areas where producers are unorganized its adoption is certainly a step in the right direction.

Before leaving the subject of producer pricing a word about the method used in establishing the prices for the various classes seems most pertinent. The fluid milk and cream price is a bargained price in all organized producing areas, agreed upon by a public hearing in the case of state or federal markets or by the local milk producers associations and the distributors in unregulated markets. The policy followed by the Montana Milk Control Board is an excellent example of inadequacy. The schedule of prices used is established by a public hearing. Because these hearings are costly and cumbersome the schedule adopted remains in effect for a long period of time. No effort has been made to make these prices flexible nor is a differential used to alleviate seasonality. As a result, a uniform price is paid throughout the year and a producer is actually encouraged to increase his production during the months of low cost production and surplus supply.

To combat this situation a few distributors in Montana have set up the base surplus system. Others have been reluctant to do so for fear of losing producers whom they have been dependent upon for their source of supply. At any rate, where the base surplus system is used without any

price incentive it is necessary to follow a very strict enforcement of this plan to establish uniform production.

The federally operated markets have met this problem by inserting a measure of flexibility into their plan. The fluid price is established at a fixed premium above the manufacturing milk price and a seasonal differential is added to this price to further increase the incentive for a uniform production and compensate the producers for the higher cost incurred.

Milk Price Determination. The theory of milk price determination is a very interesting one. The concensus of opinion among dairy marketing economists is that it is a special case of price discrimination between markets different in form.<sup>58/</sup> A given producers association is faced with a relatively inelastic demand for milk sold as fluid, a unitary demand for milk sold for manufacturing and an elastic demand for fluid cream.<sup>59/</sup> The producers association, if it were to maximize returns, would sell the amount on every market that would equate marginal revenues for all markets. The amount sold in each market is directly dependent upon the point of inter-section of the marginal revenue curves for the various markets. All milk up to the point of intersection of the marginal

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<sup>58/</sup> This analysis pertains only to organized milk producers.

<sup>59/</sup> No conclusive agreement has been reached by marketing economists as to the degree of elasticity. However, the universal opinion is that the relationships are as given. See Waite, W. E. and Trelogan, H. C., Introduction to Agricultural Prices, p. 25.

revenue curves would be sold as fluid and beyond that point the product would be diverted to the manufacturing channel if the association were to maximize their returns.

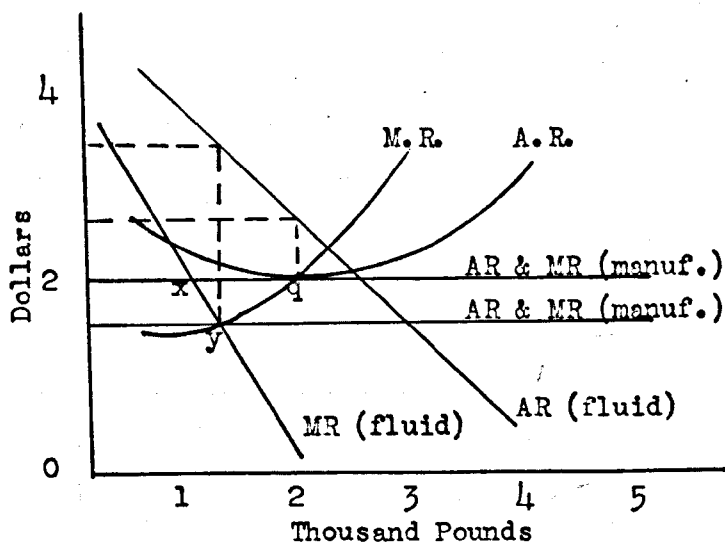


Figure 8. Milk Revenue Curves

In Figure 8 if the marginal revenue price of the manufacturing milk was \$1.50 the association would sell only in the fluid market. Short-run equilibrium would be established at point (y) with an output of 1,400 pounds. Beyond this point the marginal cost exceeds the marginal revenue from any of the markets, making further production unprofitable. However, if the marginal revenue in the manufacturing market were increased to \$2.00, the association would sell 1,000 pounds in the fluid market and 1,000 pounds in the manufacturing market. At this point the association would be at long-run equilibrium for the marginal cost and average cost are equal and no abnormal profit would be made.

The individual producer, however, is faced with a perfectly elastic demand curve for each market. But he is limited in his sales in the fluid market by a quota. If all the producers had a proportionate quota their combined fluid sales should be at the point of equality of the marginal revenue curves. (Assuming no operation costs for the association.) This seldom, if ever, happens so the additional profit made by the association is distributed to its members pro rata.

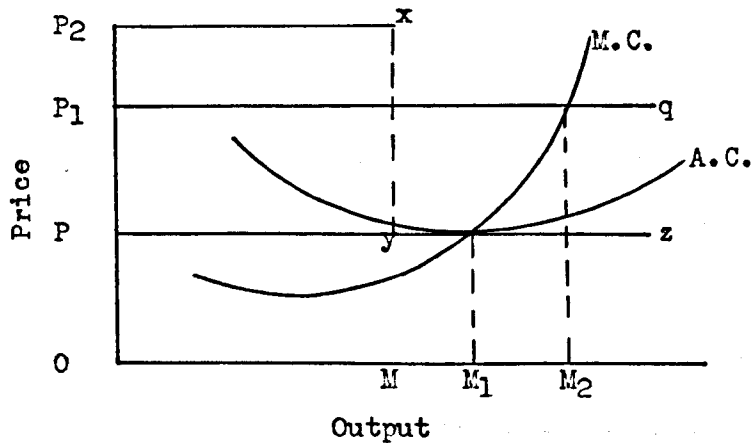


Figure 9. Milk Revenue Curves

In Figure 9 a diagram is given of the individual producer's demand curve where a market quota is in effect, and also the demand curve to the producer in those associations using a pool price system and allowing freedom of entry and full production. If the price were  $OP$  in the manufacturing market and  $OP_2$  in the fluid market the producer's demand curve would be  $P_2XYZ$  under a market quota in the amount  $P_2X$ . Total production would be  $OM_1$ . Fluid sales would be  $OM$  and manufacturing sales  $MM_1$ . In those associations using a pool price system (blend price) the producer's



demand curve would be  $P_1Q$  and the output would be increased to  $OM_2$  assuming a blend price of  $OP_1$  and complete freedom of entry and production.

These are important considerations to make by any producers association when bargaining for price and in marketing the raw product. From the consumer's viewpoint it is another matter. The fluid consumer is being subjected to monopolistic pricing and is in reality subsidizing the production of fluid milk used for manufacturing purposes. However, were it not for price discrimination it is entirely possible that the fluid consumer might pay even a greater price for his product. In both Figures 8 and 9 it was shown that total production would be increased through price discrimination. This may allow the individual producers to achieve economy of scale and thereby reduce the per-unit costs of production.

We must also recognize that the higher cost to the fluid consumer is not wholly attributable to the monopolistic pricing. The necessity of maintaining a stable supply of a high quality milk is a more important reason for these premium prices.

One further observation should be made regarding the elasticity of demand for the product. An often neglected, yet very important, factor in demand elasticities is the difference between retail demand elasticity and distributor demand elasticity for identical products. This difference is due to the middleman's margin which usually remains rather stable. A hypothetical example should aid in clarifying this point. Upon first looking at the curves in Figure 10 it would appear each demand curve had

the same elasticity. But application of the elasticity formula to these data show quite another result. The coefficient of elasticity may be calculated by the following formula:

$$\frac{\frac{\text{change in quantity}}{\text{average quantity}}}{\frac{\text{changes in price}}{\text{average price}}}$$

Substituting the given data in the appropriate places we arrive at the following fractions for each of the demand curves:

$$\frac{12-8}{-24+16} \cdot \frac{20}{10} = \frac{80}{-80} = -1 \text{ (retail demand)}$$

$$\frac{12-8}{-14+6} \cdot \frac{10}{10} = \frac{40}{-80} = -0.5 \text{ (distributor demand)}$$

This clearly shows that though corresponding changes take place in quantity the effect upon the elasticity of the demand curve is entirely different. The wider and more stable the margin the less elastic the distributor demand in comparison to the retail demand. Aggressive producers associations by bargaining procedures change the distributor demand curve (flexible margin), for net revenues could not be maximized if the producers association based their sales on the derived distributor demand curve.

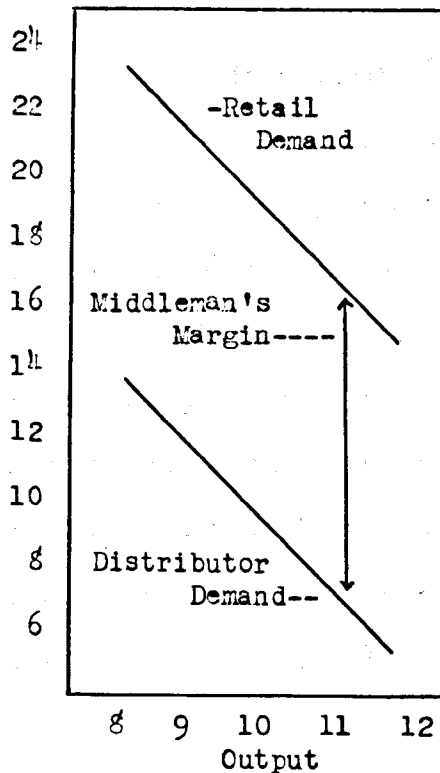


Figure 10. Demand Curves

Consumer Pricing. The problem of consumer pricing is well put in the following quotation: "Is it possible to make milk distribution more competitive, so that competition will reduce costs? Or is milk distribution so inherently monopolistic that it is necessary to bring it under public utility<sup>60/</sup> regulation or some other form of public control?"<sup>61/</sup> Authorities are in general disagreement on this question. Bartlett, a strong proponent of free competition, has presented some very strong arguments indicating that free competition does reduce costs. On the other hand, Mortenson has presented equally as strong arguments in favor of public utility regulation. Excellent examples may be found where each has proven their worthiness. Their success would be dependent upon the psychological and physical characteristics of the market. In one market its make-up may favor free competition; in another public utility regulation may be best applied. That one is better than the other universally seems to be an invalid argument.

A more logical method would be to incorporate the virtues of each into a single policy. This could easily be done by enacting the necessary legislation to enforce complete public utility regulation, but applying only the necessary amount of regulation in any market to assure maximum efficiency. By adopting such a policy a great deal of flexibility would

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<sup>60/</sup> A public utility is herein defined as a privately owned monopoly under government regulation. We must recognize that a distributing system could be under complete public control. Widespread adoption of such a system in the United States does not appear to be ready for public acceptance except in limited cases in municipalities.

<sup>61/</sup> Shepherd, G. S., Marketing Farm Products, p. 297.

be had, enabling the administrative board to meet the varying physical and psychological characteristics from market to market. In some markets little if any regulation would be necessary, in others it may be necessary to invoke stringent regulation measures.

#### A Price Policy For Montana

The objectives of a sound price policy have been given.<sup>62/</sup> The problem now is one of setting up factors to achieve these objectives. Regulated producer pricing incorporating flexibility would be the first of these factors. The purposes underlying regulated producer pricing are to assure a stable supply of quality milk, improve the bargaining position of the small and unorganized producer, and prevent large and well organized producers associations from exerting demoralizing monopoly practices. It shall be the regulatory board's duty to first hold a market-wide public hearing for the purpose of establishing the state-wide premium price differential for fluid milk. Upon the basis of the evidence gathered at the public hearing the board at its discretion shall establish the differential to be used until conditions warrant a change. There will then be another public hearing to determine the new differential. During this interim the producer price of fluid milk shall fluctuate with the price of manufacturing milk. This latter price being determined by the free forces of supply and demand. This measure of flexibility in price will greatly aid in maintaining a balanced relationship between grades of milk

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<sup>62/</sup> Refer to pages 80 and 81.

and at the same time reflect to a considerable degree changes in consumer demand. Many advocates of producer price formulas are reluctant to continue price hearings. However, public hearings when properly conducted are an excellent medium for knitting together the various interests of the dairy industry and in reorientating our pricing formula periodically. It is an impossible task to develop formula factors that will indicate the proper relationships over an indefinite period of time.

The second factor to establish is that of seasonal production differentials. During the flush season no differential will be used, but during deficit seasons a graduated differential increasing with lack of supply will be in effect. This will compensate the producer who complies with the seasonal market needs for his added effort and costs and create an incentive to stimulate further uniform production.

Differential per point of fat buying will be the third factor in our pricing policy. This is the only buying method yet developed that will properly pay the producer for value received. We have discussed this earlier in the text so further elaboration at this point is unnecessary.

The fourth factor will be the establishment of the combination plan. This will be necessary to keep production within the needs of the market, to assure the uniform producer that he will be rewarded for his efforts and allow the distributor to pay for the product on a use basis. If no plan were used it would be necessary to pro rate the proceeds from fluid sales by volume marketed and this would allow the seasonal producer a larger share than is justified.

Abolishment of retail price fixing and establishment of competitive consumer pricing is the fifth of these factors. This is necessary to provide flexibility in meeting the needs of the different market places, to speed up the adoption of technical advances, and prevent a general stagnation of our distribution mechanism.

The last factor is regulation authority over selling procedures. By this is meant that we must set up the necessary legal machinery to meet any emergency that would be detrimental to the dairy industry and the consuming public. Too often in the past we have been without the power to act and before the necessary laws could be enacted much damage was done. Further, the mere creation of such power would create a psychological stabilizing influence. Price cutting and other demoralizing trade practices would seldom be resorted to if these firms knew that prosecution could be immediately effected.

Judging from the limited number of factors that are necessary to a price policy the reader may feel that we have been overstating the case. However, theorizing is not the same as institutionalizing and this is what makes our problem difficult. Nevertheless, the author is optimistic as to public acceptance of such a proposal. It is believed that only the last factor would create any great dissension.

### Milk Transportation

No single marketing process has so completely revolutionized our milk industry as that of transportation. Up until two years ago we in Montana were still in the "horse and buggy" age with respect to transportation of fluid milk. With the advent of the paper bottle, coupled with the refrigerated truck, our milk marketing structure took on a new form. Today it is not uncommon to transport cartoned milk long distances. Milk is being shipped from Kalispell to Chinook, Malta, and eastward. Missoula to Butte and Bozeman to Shelby are other daily runs. These are only beginnings in what promises to be a vast marketing network. A network that will pick up the product from the favorable producing areas of western Montana and deliver it to the remotest corners of the state.

In densely populated regions of the United States this process has been in progress for years. Railroads were the first medium of transportation to develop methods for "long haul" shipments of fluid milk. Glass-lined tank cars proved to be quite satisfactory in preventing deterioration and also enabled the lines to greatly reduce costs. After the motor trucks proved their practicability they too adopted the use of glass-lined tanks to handle long shipments of bulk milk. At present there is rather an ingenious system in these densely populated areas. An interchangeable tank has been developed that allows the motor truck to pick up the supply from the producing area, transfer it to the main line flat car and then again pick it up at the final destination to be delivered to the distributing plant.

Studies in these areas have shown bulk shipments of more than 170 miles are generally more feasible via rail and in shorter hauls the truck has proven most satisfactory.<sup>63/</sup> The trend has been, however, to one of ever lengthening the feasible working distance of the truck. Likewise the refrigerated truck has practically replaced the railroad in hauling paper and glass bottled milk.

What type of milk distribution system is in store for Montana? The mountain region will be the source of fluid milk supply. Distributing plants will be halved and increased in scope--particularly in the plains region. Unless the eastern distributors take immediate steps complete elimination of processing in these areas appears a likelihood. Their function then would be solely that of a wholesale distributor. Packaged milk would be secured from large western processing plants and distributed by these wholesalers to grocers and milk handlers of outlying towns and villages.

The wholesale distributor would have the alternative of shipping bulk milk to his plant, bottling it and then performing the normal wholesale functions. The inclusion of the processing operation in his plant would be dependent upon the transportation differential of packaged and bulk milk from the western producing areas and upon the processing differential of his plant and the western processor. At any rate, these units would be widely dispersed. Possible sites for these plants in the plains region

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<sup>63/</sup> Caskey, W. F. and Bartlett, R. W., Milk Transportation Problems In The St. Louis Milkshed, p. 428.



would be Billings, Miles City, Wolf Point, Malta, Havre, Lewistown, Great Falls, and Shelby. Such a wide distribution of plants would allow each firm to achieve economy of scale and render creditable service to its patrons. This system would be similar to our present-day marketing system for bread and beer.

Trucks will play the predominate part in the transportation transformation in Montana. They are far more flexible, few, if any, delays enroute would be encountered, less handling of the product is necessary, and truck rates are more favorable. Trunk line railroads could conceivably ship large quantities of milk to the eastern districts where it would be distributed by truck to outlying towns. But they have made no determined bid to provide this service as to date. Rail service is being used satisfactorily in Utah at the present time to transport packaged milk hundreds of miles. The possibility of using rail service should certainly be explored before embarking upon large capital expenditures for motor transports.

Much can be done in the way of research by our public institutions to effect a better marketing system during this period of reorganization. Topics for special consideration should include; 1. Market requirements, 2. Potential supply of our western producing areas, 3. Determine the most feasible method of transportation to each area, using comparative cost studies, flexibility needs, and available facilities as criteria to base any recommendations, 4. Study ways and means of coordinating the producers and distributors, 5. Again by cost studies determine the optimum size and location of distributing plants, and 6. Determine what may be expected in

the way of competition from outside areas. A promising future is in prospect for fluid milk transportation in Montana. The planning can be started at the "grass roots" for Montana is not confronted with the disestablishment of present day practices. Densely populated areas have determined many desirable practices through cost and efficiency studies, but have been stymied in the application of these practices because the present methods are firmly entrenched.

#### Economies of Scale

Unit size is very important in achieving economy in any line of endeavor. Cost studies have conclusively determined that larger firms, up to a certain point, have lower per unit costs. Many factors are responsible for this. Larger firms have a better opportunity to equate their production resources to the "Equa-marginal" principle, specialization of labor and management is possible, credit and markets are more accessible, and improved methods of operation are first made available to these firms. There are other illustrations that could be given but these serve to illustrate that size is an important factor in achieving economy.

Economy of scale is not limited to the firm itself. Each production factor is likewise subject to such an analysis. An example of this in the dairy industry is the converting unit, the cow itself. Figure 11 is based upon a cost study of the Los Angeles milkshed in 1941.<sup>64/</sup> The least

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<sup>64/</sup> Black, Clawson, Sayre, and Wilcox, Farm Management, p. 400.

cost point of production would be around 8,300 pounds. (Per cow production in Montana is roughly 5,000 pounds.) A gradual decrease in cost may

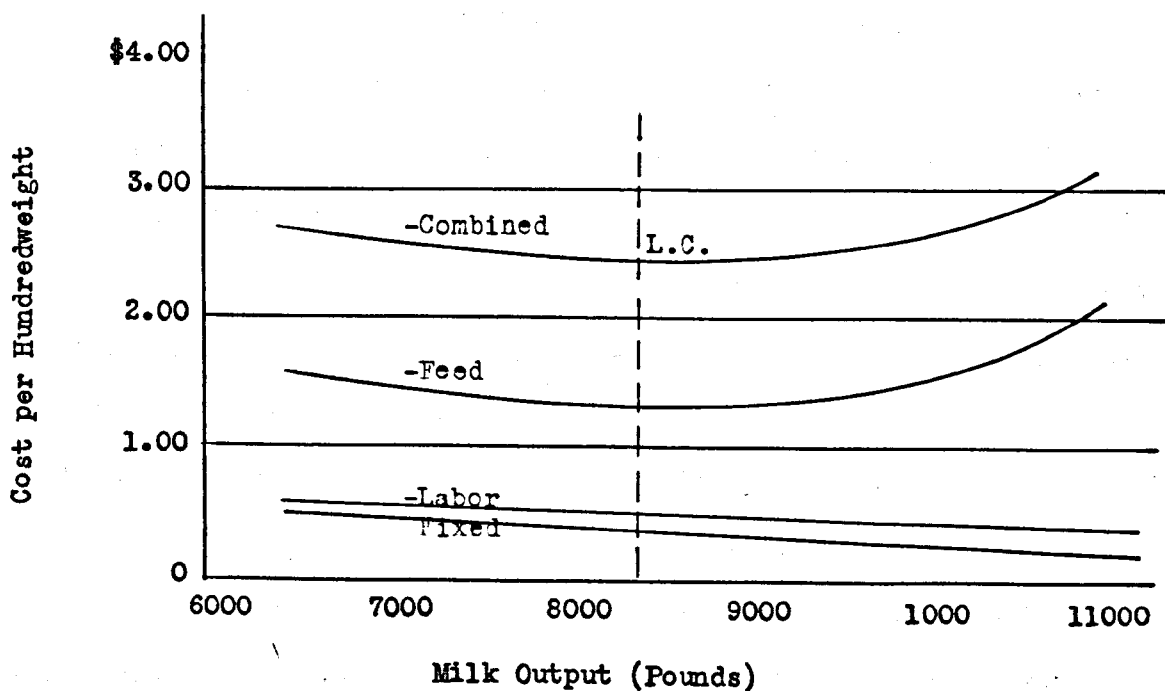


Figure 11. Feed costs, labor costs, fixed costs, and combined costs per hundredweight of milk with varying outputs resulting from varying rates of feeding.

be noted up to this point and beyond an increase takes place. The optimum point of production would not be the same for all animals, but the principle remains unchanged.

Production per cow by size of herd is commonly used as a criterion for emphasizing the economies resulting from increased scale. Data of this type are valuable but must be used with some reservation. Cost data must be applied to determine the optimum unit size. Table VII shows the relationship between herd size and per cow production. Per cow production increased quite rapidly as herds were enlarged. There is no indication

from this data that a decline will take place. However, it may be noted that per cow production in only one instance exceeds 8,000 pounds. Referring back to Figure 11 we find that total costs were declining past the 8,000 pound production point. If these input-output relationships are indicative of dairy production costs we could expect the production per cow to reach an output of 8,000 to 9,000 pounds in the larger herds and then level off. Beyond this point marginal costs would be above the long run equilibrium point and unless price is very favorable further production increase per cow is unlikely.

Another interesting example of production per cow by size of herd is found in a district breakdown of Montana. In this analysis the author determined the average size herd and average per cow production for each district upon the basis of census data. The findings are represented in Figure 12. We who are familiar with the state know that Districts 1 and 5 are generally more favorable producing areas. Nevertheless, the close correlation between herd size and per cow production must not be taken lightly.

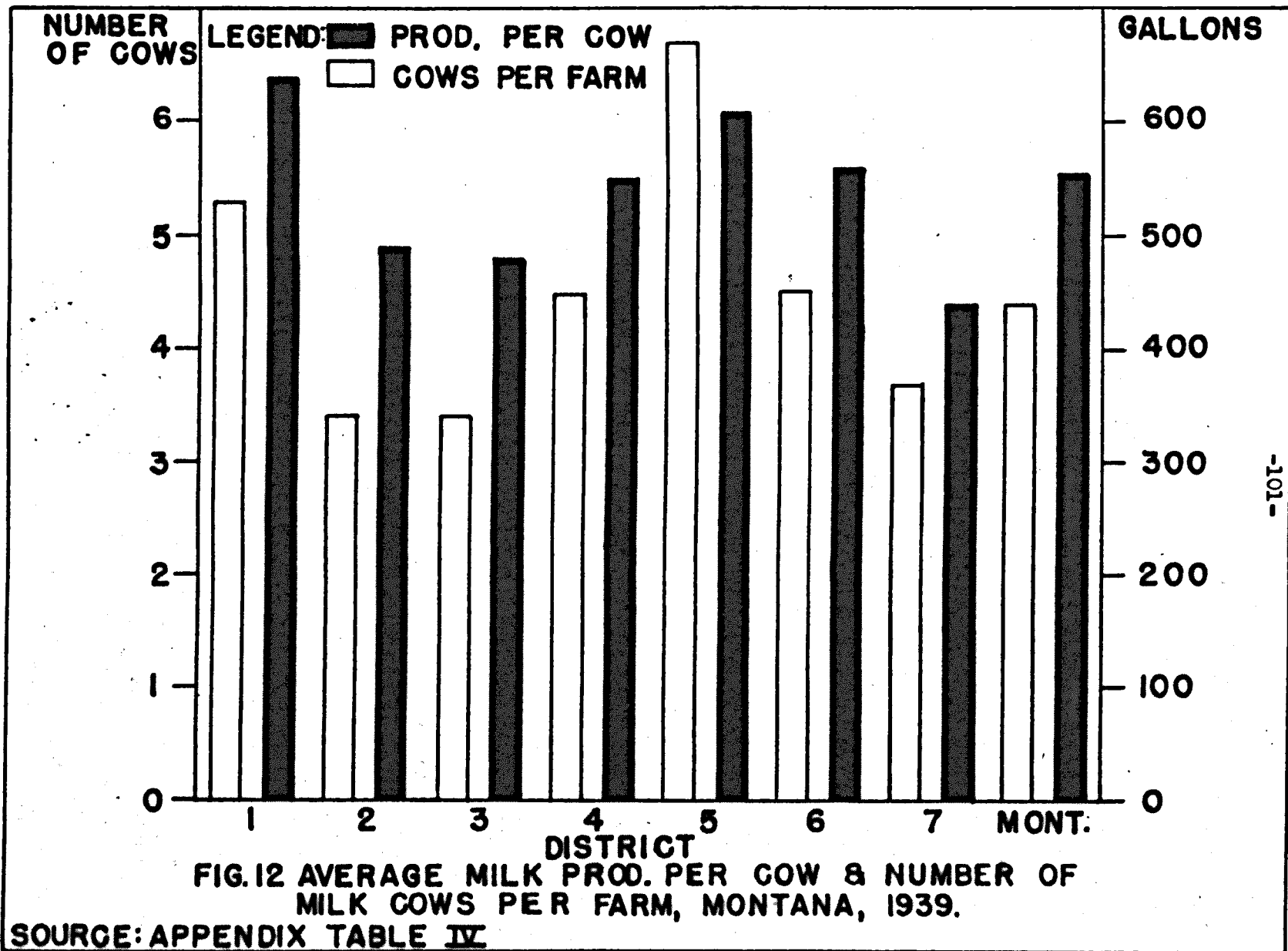
This statement is verified by a similar study conducted at Wisconsin 23 years ago. The summary of this report has this to say, "These results indicate that the law of diminishing returns is applicable to the cows of this area. The herds with larger production received more feed than did the herds with lower production, but not proportionately more, so that the more economical production was obtained from the higher producing herds.

Table VII. Milk Produced Per Cow by Size of Herd,  
Selected States, 1939, 1944.<sup>1/</sup>

State	1-2 Cows		3-9 Cows		10-19 Cows		20-29 Cows		30 Cows & Over	
	1939 Pounds	1944 Pounds	1939 Pounds	1944 Pounds	1939 Pounds	1944 Pounds	1939 Pounds	1944 Pounds	1939 Pounds	1944 Pounds
Montana	4197	4300	4524	4438	5177	4868	5747	5244	6579	6767
Colorado	4291	4111	4205	4274	4455	4721	5393	5937	6398	6116
N. Mex.	3526	3612	3689	3612	4248	3474	4911	2476	6476	8238
Calif.	5366	5814	5349	6003	6011	6484	6349	6872	7387	7990

Source: The Dairy Situation, January 1949.

<sup>1/</sup> Computed from Bureau of Census Data.



There were marked diminishing returns, however, for the herds producing more than 7,000 pounds of milk."<sup>65/</sup>

Economy of scale in the distribution unit is usually more easily determined. This is because there are fewer variable factors, which must be held constant or adjusted for, and control of these factors is usually easier. Labor cost or output is often used to illustrate the advantages of relatively large scale operations for milk processing and distribution. Labor costs are a significant part of total costs and it is usually easy to determine the amount of labor used. An example of labor output study is given in Table VIII. A frequency distribution was made from an exten-

Table VIII. The Average Volume of Milk Handled Per Employee In Plants of Different Capacities.

Capacity (Gals.)	Gallons Per Employee
500 or less	103.3
501 - 1000	161.4
1001 - 2000	206.9
2001 - 3000	232.7
3001 - 5000	264.5
5001 - 10,000	340.2
10,001 - 20,000	341.0
Over 20,000	344.4

Source: Harrington, B. L., Milk and Milk Processing, p. 9.

sive study of milk plant operations to show the relationship between plant capacity and volume of milk handled per employee. The gallons handled

<sup>65/</sup> Ezekiel, M.J.B., McNall, P. E., Practices Responsible for Variations in Physical Requirements and Economics Costs of Milk Production on Wisconsin Dairy Farms, p. 18.

per person is increased rapidly with larger plant capacity up to the 5,000 - 10,000 gallon plant. From this point on there is an immediate leveling off. This again indicates that size is very important to achieving an economic unit.

A recent cost study in Montana reveals similar results only in terms of dollars and cents.<sup>66/</sup> It is stated in this study that, "The smallest distributors had labor costs of 3.27 cents per quart of milk, which were the highest for any size group. The size group handling 500 - 999 quarts daily had labor costs of 2.83 cents per quart, and the two largest distributors had labor costs of only 2.34 cents per quart or almost one cent less than the small distributors ... Labor costs were 51 per cent of the total costs of distributing milk."

Discussion thus far has been limited to the internal economies of the individual firm. There are also external economies such as selling costs, procurement costs, and administrative costs that are achieved through larger sized units. These are more difficult of determination, but some work has been done along these lines proving that the job is not insurmountable.<sup>67/</sup>

Non-pecuniary costs must also be considered when making scale comparisons. This is especially true in dairying for it is an exacting science and demands daily attention year in and year out. Operators of

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<sup>66/</sup> Korzan, op. cit., p. 23.

<sup>67/</sup> Refer to the series, Efficiency of Milk Marketing in Connecticut, Bul. Nos. 237, 238, 239, 247, 248, 249, 252, and 253.



units employing no outside labor must remain on the job constantly. It is only when family labor becomes plentiful or neighborly labor is available that these operators can enjoy any recreation or travel. If alternative enterprises are open to these operators a higher net return from the dairy enterprise must be forthcoming to encourage their entry. Relatively large firms are not faced with this situation. These operators can assign their duties to one of their subordinates for extended periods. To them the above non-pecuniary costs are less important or of a different nature.

A study of economies of scale is particularly pertinent during this period of reorganization. This is an excellent time for actual achievement. It is difficult to change any institution after its framework has been established. With intelligent research and planning, we can contribute significantly to the welfare of our peoples and to the dairy industry by establishing guide posts along the way on which new and old firms may base their future plans.

### Irrigation

No study of the dairy industry in Montana would be complete without a recognition of the importance of irrigation. Irrigation and dairying in this region are much like the peanut and baseball in sports circles. Irrigation is necessary to carry out stable and efficient dairying practices and the peanut is essential to give maximum satisfaction to the spectator at a baseball game. Contrary to the views of many, dairying is not essential to irrigation. This point is of great importance during this period of dairy reorganization and contemplated irrigation expansion. Before elaboration on this subject let us say a word about irrigation and dairying.

It appears at this writing that the dryland dairy farm has gone the way of the horse. With the improved techniques in processing and transportation our dryland farms can no longer compete with the favored irrigated dairy areas of Montana. It has been estimated that between 65 and 75 per cent of all milk produced in Montana is produced on farms that make use of irrigation. In all likelihood this figure will climb to 85 or 90 per cent within the next decade.

The Bureau of Agricultural Economics is highly interested in securing reliable dairy production estimates. Their latest innovation has been to use irrigated hay production as the basis for estimating the extent of dairying done on irrigated lands. This figure they have termed the "irrigated hay factor." The difficulty in using a factor of this type is that hay is not fed to dairy cattle alone and also the proportion of irrigated hay fed to dairy cattle varies from area to area. In spite

of these shortcomings the results determined from this method appear quite reasonable. The author refined the factor somewhat by using only tame hay production figures. This is under the assumption that very little wild hay is fed to dairy cattle even in the dryland areas. His results, by districts, are shown in Table IX. The figure for Montana lies within the range of estimates given at the outset of this discussion, and the district figures conform quite closely to what the author feels are reasonable estimates.

Table IX. Tame Hay Production and Percentage Produced From Irrigated Lands By Crop Reporting Districts, Montana, 1940.

District	Total (thous. tons)	Irrigated (thous. tons)	Percent Irrigated
1	363	291	80
2	2,058	1,283	62
3	1,611	586	36
4	3,268	1,713	52
5	2,636	2,319	88
6	4,498	3,563	79
7	1,639	511	31
Mont.	19,340	12,885	67

Source: Montana Agricultural Statistics, 1946.

A more accurate method of determining the extent of dairying on irrigated lands would be to plot the milk production by M.C.D.'s,<sup>68/</sup> (these figures are available in the Census of Agriculture,) and then superimpose

<sup>68/</sup> Minor Civil Division.

the irrigated areas on this map and calculate the production totals underlying these areas. Regardless of method used and the resulting inaccuracies of these "computed" estimates we do know that irrigation is important to dairying and its importance is rapidly growing.

Perhaps the lack of need for dairying on irrigated acreages is of greater concern to us at this time than the importance of irrigation to dairying. Some people contacted by the author have felt that to establish a marketing mechanism which would produce fluid milk in the western areas and transport it to the eastern sectors is short-sighted and unpractical. The reasons given to justify these claims are that proposed irrigation developments in eastern Montana will come within the immediate future and dairying will be a major enterprise of these farms. This would alleviate the shortage of dairy products in these areas, particularly fluid milk, and in-shipments from outside producing areas will not be necessary. No one can deny that these are strong arguments. Nevertheless, even with a large expansion of irrigated acreages in these areas, fluid milk may be shipped in from outside areas. There are two clear cut reasons for this; 1. Production and processing costs will be high because of a limited market and consequent inefficiency of small scale processing, probably higher than the freight charges from outside producing areas. 2. Alternative enterprises such as the integrated use of irrigated pasturages and haylands for beef cattle and sheep production probably will prove to bring higher net returns than extensive dairy production.

Lack of dairying is not a new phenomenon to western irrigated lands.

In a study of recent date the authors say:

"Although it is frequently stated that the increased production brought about by irrigation development consists chiefly of dairy products, and of fruits, vegetables and other cash crops, it appears from the foregoing analysis that the new result of additional irrigation development is to a large extent additional production of beef cattle or sheep. Growing feed for beef cattle and sheep is the residual use for such irrigated land as is not needed for producing dairy products and cash crops. There is already a large acreage of irrigated land suitable for growing more fruits, vegetables and other cash crops--if there were a market for them. When there is additional market for them, land now used for raising feed will be shifted to their production; when there is more market for dairy products, feed now fed to beef cattle or sheep will be shifted to dairy cattle, even if there is no additional irrigation development. As a result of new irrigation development the increase in production of the more intensive commodities may take place in the new area, rather than in some other area where it would have occurred without the new development, or production in a new area may even displace production in an older area. But the net result of new land development is largely an additional amount of feed for beef cattle and sheep over the amount that otherwise would have been available."<sup>69/</sup>

To state that dairying will not be done on newly irrigated acreages would be fallacious reasoning. Dairying will certainly be a part of the operations on many units. The differentiation the author wishes to make is that these operations will contribute to the supply of the manufacturing products, but not to the fluid milk channel. Fluid production will occur only in those areas enjoying low cost production and which have a large market for their products.

To further substantiate this statement, brief mention will be made of two improved technologies that promise to outmode the paper container

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<sup>69/</sup> Selby, H. E., and Griffith, D. T., Livestock Production in Relation to Land Use and Irrigation in the 11 Western States, pp. 17-19.

within a short time. The first involves the processing of fluid milk under air-free conditions and then canning it like our present day condensed and evaporated milks. Authorities claim refrigeration is unnecessary for one to two month periods and that the product is equal in quality and taste to the raw product. The second method, which is yet in the development stage, is processing milk in the same manner as that used in the newly developed ained frozen fruit juices. The raw product is canned in a concentrated state, kept frozen until ready for use and then reconstituted by the addition of water. The canned frozen fruit juice being sold today is sold in six ounce lots and after reconstituting one and one-half pints are made available for use. Press reports have stated that these methods will be available for use within two years. It is not difficult to imagine the consequences were either or both of these processing methods adopted. Further concentration of production units to the low cost areas and a lengthened supply line would be inevitable results.

**APPENDIX**

PRODUCTION AND MARKETING MONTANA  
MILK SCHEDULE

1. Size of farm. \_\_\_\_\_ Irrigated \_\_\_\_\_ Non-irrigated. \_\_\_\_\_.
2. Acres in crop \_\_\_\_\_ Acres in pasture \_\_\_\_\_ Acres irrigated pasture \_\_\_\_\_
3. Principal source of income. \_\_\_\_\_
4. Years in the dairy business \_\_\_\_\_. Reasons for going into dairy production \_\_\_\_\_  
\_\_\_\_\_
5. Number of dairy cows. \_\_\_\_\_ Dairy breed heifers \_\_\_\_\_ bulls. \_\_\_\_\_
6. Have you increased or decreased your herd size the past 10 yrs.? \_\_\_\_\_  
Number of cows, increase or decrease \_\_\_\_\_. Reasons \_\_\_\_\_  
\_\_\_\_\_
7. Do you plan to increase, decrease your herd size in the future? \_\_\_\_\_  
Reason \_\_\_\_\_
8. Is production per cow increasing or decreasing? Are you feeding differently now? If so, how? \_\_\_\_\_
9. Do you keep farm records? \_\_\_\_\_. If so, what is the average production per year for the past 10 yrs. of your herd. \_\_\_\_\_ lbs. milk \_\_\_\_\_ lbs. B.F.
10. In what form do you market your production. A. fluid milk \_\_\_\_\_ %  
B. B.F. \_\_\_\_\_ % C. Other \_\_\_\_\_ %.
11. Do you breed your cows to reduce seasonal variation in production? \_\_\_\_\_
12. Are bonus payments made for fluid milk during the short season of supply? \_\_\_\_\_
13. Could you increase your production without enlarging your barn, pasturage, milk plant and other important production factors? \_\_\_\_\_  
\_\_\_\_\_



14. Do you feel that sanitary regulations as set down by the Livestock Sanitary Board are oppressive? \_\_\_\_\_ If so, why? \_\_\_\_\_  
\_\_\_\_\_
15. How often are inspections made? \_\_\_\_\_
16. Are you in favor of the Milk Control Board setting the minimum prices paid to the producers? \_\_\_\_\_ to consumers? \_\_\_\_\_ Reasons \_\_\_\_\_  
\_\_\_\_\_
17. Should regulations be made more rigid for B.F. production? \_\_\_\_\_  
Why? \_\_\_\_\_
18. How often do you market your, A. Milk? \_\_\_\_\_ B. B.F.? \_\_\_\_\_
19. Do you haul your own milk and cream? \_\_\_\_\_. Pick up service? \_\_\_\_\_  
alternate with other farmers? \_\_\_\_\_ Other? \_\_\_\_\_
20. What would you say are the problems in securing a good and stable supply of labor? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Table I. Gross Value of Selected  
Farm Products, Montana, 1929-1947.

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Year	Wheat	All Cattle (in thousands of dollars)	Dairy Products
1929	40,464		16,175
1930	20,128		13,183
1931	7,239		10,406
1932	19,108		8,271
1933	16,622	7,179	8,267
1934	23,757	14,224	9,275
1935	31,424	26,790	10,446
1936	14,595	28,343	11,260
1937	19,993	21,276	11,500
1938	30,473	10,746	10,133
1939	28,589	14,728	10,225
1940	31,522	20,145	11,144
1941	59,368	25,180	12,945
1942	71,931	37,549	14,765
1943	100,835	38,272	17,351
1944	99,656	56,379	16,977
1945	82,289	73,140	16,603
1946	116,343	94,790	19,723
1947	153,737	111,080	21,967

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Source: Montana Agriculture Statistics, 1948.

Table II. Production and Seasonal Fluctuation of Milk, Butter, American Cheese, and Cottage Cheese, Montana, 1948.

Month	Milk		Butter		American Cheese		Cottage Cheese	
	(Mil. lb.)	%*	(000 lb.)	%*	(000 lbs)	%*	(000 lb.)	%*
January	39	76	529	73	133	57	58	76
February	39	76	505	70	140	60	66	86
March	46	90	606	84	156	66	78	101
April	52	102	695	96	187	80	79	102
May	67	131	982	136	331	141	80	105
June	74	145	1,160	161	391	166	82	107
July	68	133	1,086	150	398	170	87	113
August	58	114	881	122	319	136	83	108
September	49	96	687	95	260	111	82	106
October	46	90	589	82	210	90	83	109
November	37	73	461	64	147	63	76	99
December	36	71	455	63	145	62	68	88
TOTAL	611	100	8,636	100	2,818	100	921	100

\* Percent of yearly average.

Source: Production statistics taken from Crops and Markets, Vol. 26, p. 55. Manufacturing statistics taken from Monthly Montana Dairy Products Report, January 31, 1950.

Table III. Disposition of Milk  
Produced, United States, Montana, and  
by Crop Reporting Districts, 1944.

District	Milk Produced		Whole Milk		Cream and Butter Used on Farms			
	B.F.	%	B.F.	%	B.F.	%	B.F.	%
	(Thous. lb.)		(Thous. lb.)		(Thous. lb.)		(Thous. lb.)	
1	6,932	100	2,492	36	3,015	43	1,425	21
2	3,089	100	469	15	1,228	40	1,392	45
3	2,648	100	210	8	1,278	48	1,160	44
4	3,300	100	768	23	1,295	39	1,237	38
5	3,118	100	1,203	39	1,240	40	675	21
6	4,029	100	652	16	2,229	55	1,148	29
7	1,444	100	167	12	518	36	759	52
Montana	24,560	100	5,960	24	10,703	44	7,897	32
U. S.	4,317,762	100	2,576,269	60	840,145	19	901,349	21

Source: U. S. Census of Agriculture 1945.

Table IV. Average Milk Production  
Per Cow and Number of Milk Cows Per Farm,  
Montana, 1939.

District	Cows Per Farm	Production (gals.)
1	5.3	642
2	3.4	497
3	3.4	480
4	4.5	556
5	6.6	609
6	4.5	559
7	3.7	444
Mont.	4.4	558
U. S.	4.7	525

Source: U. S. Census of Agriculture, 1940.

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