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The Demand for and Consumption of Fluid Milk in Logan, UT, 1949

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THE DEMAND FOR AND CONSUMPTION OF FLUID MILK IN LOGAN, UTAH, 1949

by

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INTRODUCTION

Scope

Dairying is one of the most important agricultural enterprises in Utah. Income from the sale of dairy products by farmers within the state comprises about fifteen percent of the total farm income. Milk and its products are an essential part of the diet of practically all consumers. Its widespread use makes it a commodity that should receive special consideration and study. The continued growth of the industry depends upon how well it can meet the demands of the consumer in supplying quality dairy products at reasonable prices. The problems that need particular attention to bring about continued growth are efficient production on the farms, programs to increase the demand for and consumption of milk, sound price policies, seasonality of milk production, price spreads for milk of different grades and uses, and reduction in marketing costs.

One of the most important problems in the industry is the great need for more precise information concerning the demand for and consumption of fluid milk. Elasticity of demand for milk is one segment that needs particular attention and study. A better understanding of the effects of price changes on consumption is basic to a more efficient and serviceable marketing program. Along with this information, consumer preferences and consumption patterns should be studied for additional knowledge that would be useful in the industry. The object of the industry should be to satisfy the demand and desires of the consumer. To achieve this end, relationships between milk consumption, income levels, family size, age groups and occupation should be determined.

Purpose

The information contained in this report attempts to add to the store

of knowledge required to meet and solve the problems of the industry. A fluid milk price war in Logan, Utah, during October 1949 allowed drastic fluctuations in the price of milk to the consumer. This condition furnished an ideal work-shop for obtaining data that may be used for establishing more factual information as to the elasticity of demand for milk. A consumer survey was made from random samples during the month of November 1949. An endeavor was made to learn through personal interview the consumption patterns of the consumer and his reaction to price changes. The questionnaire was designed to obtain data for three different periods of time, before the price fluctuations, during the price fluctuations, and after the price fluctuations.

The data set forth herein are primarily a summary and a presentation of this primary information. It was obtained from 405 consumer surveys made by three enumerators within the city limits of Logan, Utah. Previous work done in the field has been drawn upon freely to help clarify and analyze the data obtained.

Description of Area Studied (3)

Logan is the county seat of Cache County. The county's borders enclose fertile Cache Valley at the north end of Utah. United States census figures for 1940 list the population of Logan as 11,686. Estimates for the 1949 population range upward from 15,000. About ninety percent of the population is American born, most of these having been born within the State of Utah. English, Swedish and German are the predominating nationalities of the foreign-born residents. The city has the reputation of having no permanent colored population. Logan covers an area of six square miles and is situated at an elevation of 4,535 feet. The mean annual temperature is 47.5 degrees F., with extreme temperatures ranging from -25 degrees F. to about 100 degrees F.

Logan is the trading center for Cache Valley. Its retail area includes a total population of about 45,000 people. Good roads and highways conveniently connect the outlying areas with Logan. The city relies heavily upon the Utah State Agricultural College and the outlying farming sections for trade to make it a prosperous community.

The population of Logan is fairly homogeneous throughout the city, both as to nationality and income. There are no distinct slum or wealthy areas, but rather a scattering of new homes among the old. Early homes clearly indicate that they were situated on lots large enough for gardens, fowl and some animals for a self-sufficiency type of living. Many of these larger lots have been divided to provide sites for the erection of new homes. Outlying areas have expanded by intermingling moderate and more elaborate homes.

The influence of the Utah State Agricultural College with an enrollment of about 5,000 students and a staff of scholarly men and women has helped to make Logan a city of culture and refinement. To add to this cultural influence has been the contribution of religion. The Latter-Day-Saint temple in Logan has been influential in bringing many people to the city for religious reasons. Some older people have retired from active work and moved to Logan to do temple work. Other churches, organizations and clubs have also contributed greatly to the cultural development of the city.

The type of development and growth that has been characteristic of Logan has had a tremendous influence on the marketing of milk. The self-sufficiency type of living that was common in the past can still be found in many places. "Family cow" is still a fairly common expression and is of fairly common occurance. Many families buy their milk from a neighbor or a relative that owns a cow. The amount of milk going

through channels other than the normal commercial outlets is fairly large. Although this practice is neither condemned nor condoned, it must be a constant consideration in studying the marketing of fluid milk.

Cache Valley has been noted throughout western United States as a dairy region. Dairying is the chief agricultural enterprise of the valley. Receipts from the sale of dairy products amounted to about $2,800,000 in 1949 (3, p. 18). Many Logan citizens have some connection with this business. Many of the consumers contacted in this study indicated a special interest in dairying and the marketing of its products.

REVIEW OF LITERATURE

Since fluid milk is a bulky, perishable product, marketing is a difficult job. The problems involved in getting milk from the farm to the consumer have been the object of considerable investigation and study, especially in recent years. One pioneer in this investigation was Dr. Clyde L. King (17). His study was primarily concerned with the economic forces that fix the price of milk in a free competitive market. The purpose of his work was to show that the wide public acceptance and use of milk made the price of milk of general concern to all people. King maintained (17, p. 12), "the price of no other commodity represents so much for good or ill to public and individual welfare as does the price of milk." His studies covered pricing of milk to the producer, cost of distributing milk, and fair price policies to the consumer.

Dr. H. A. Ross made the first thoroughgoing analysis of demand and consumption of milk. His work covered the New York (20, 22) and Chicago (21) markets immediately after World War I. In both markets he found that the quantities sold varied very little with price changes, when customers were accustomed to price adjustments, and when the change was not greater than one cent per quart. He found that the consumer expressed great opposition to an increase in the price of fluid milk when he had been accustomed through years of experience to milk prices that remained constant. In New York from November 1907 to October 1916, grade B milk was held at a constant price of nine cents per quart. When the price advanced to ten cents per quart in October 1916, much opposition developed and consumption was materially curtailed. Between 1919

and 1924, there were thirteen increases and fourteen decreases in the price of a quart of grade B milk. Studies of these fluctuations revealed that the average curtailment in sales following a one-cent advance was almost insignificant when consumers were accustomed to some fluctuation in price. Similarly, a one-cent reduction in price brought about no noticeable increase in sales. These studies also indicated that any increase or decrease in sales because of a one-cent price change was not maintained very long. His research pointed out that after the first shock of price fluctuation there was a tendency for consumption to move back toward its former level. Ross' contributions also included rather intensive work on demand influences other than price change such as seasonal variation, temperature influences, quality factors, sales effort and general business conditions.

Professor J. D. Black (12), Harvard University, contrary to Ross' point of view, maintained that the full effects of a price change were likely to extend over a period of several months, when housewives find through experience how they can arrange their budgets to fit the price that is established. These differing points of view may be consistent over a period of time as adjustments and changes are made. Three distinct phases were noticeable with milk price changes: (1) psychological effect when prices first change, (2) recovery from the shock, and (3) long-run effects of price change that are tempered through experience and adjustment.

Earl M. Hughes (15) and Charles Blanford (7) made valuable contributions in dairy marketing by studying various methods of milk distribution. Relation of consumer prices to labor efficiency, route efficiency, and type and size of processing business were studied. They also studied comparisons in consumer cost and consumption between

store and home delivered milk. Price differentials for quantity buying were also studied as a means of reducing milk costs to consumers and of increasing the consumption of milk.

More recently, Dr. Leland Spencer (24) made outstanding contributions in dairy marketing research on the New York milkshed. Investigational work conducted in 1937 compared the price of milk to prices of other basic commodities and to the general price level. Spencer found that fluid milk price changes tended to lag behind both price changes in other agricultural commodities and the general price level. He indicated milk consumption does change with price level and consumer income, notwithstanding the fact that many persons consider milk an essential food at any cost. In a later seven-year study (1941-1948), Spencer (23) reported a trend away from home delivery of milk to store distribution. Contrary to popular belief, his study of the six leading milk companies in the New York milkshed revealed that these companies made a low rate of earnings, on either an investment or a sales basis. He found that labor costs made up nearly three-fifths of all milk distribution costs. This condition makes marketing cost reductions largely dependant on wages paid to labor and to increased efficiency of labor. He reported that large milk distributors were subject to political attacks and unfavorable publicity. They also experienced more difficulties with labor unions and labor management.

Dr. Roland W. Bartlett (6), another present day authority, found that consumer income and price are the two most important factors influencing changes in per capita sales of milk. He found that there was an increase in total consumption of milk as the proportion of store milk to home delivered milk increased. A decreasing price differential between store milk and delivered milk tended to decrease sales of store milk.

Evidence that he presented indicated that lower per capita consumption was found in regions of high temperature and in areas where there were a high proportion of Negroes. Bartlett also studied the use of paper containers as a means of packaging milk. He made comparisons in the cost to the consumer between glass and paper milk containers. He predicted increasing use of single-use containers in store sales of milk. He made comprehensive investigations in using paper containers to increase the marketing areas and distances that milk could be transported.

Other investigators, researchers and workers in the dairy industry have also made valuable contributions in dairy marketing. The length and purpose of this report prohibits their review. Only those with the most direct application to this study have been considered.

METHOD AND PROCEDURE

Method of Sampling

The data analyzed in this report were collected from a random sample of the consumers in Logan. For purposes of sampling, the city was divided into 141 segments or blocks. (See figure 1.) In general, the regularly constituted city block was considered as one unit. Exceptions were made where the street patterns were irregular, or where the number of dwelling units[1] within a given block area was insufficient to justify a block division. An effort was made to have a minimum of fifteen dwelling units per block. The maximum was restricted to thirty-five dwelling units. In drawing the sample of the universe studied, a population map[2] was used for purposes of weighting each block. The weighted block units were selected through a random process so that the chances of being selected were in proportion to the number of persons residing on the block. Twenty-one blocks out of the total 141 blocks were selected to be surveyed. This represented about one seventh of the total block universe and about one tenth of the dwelling units in the city.[3] The blocks selected were well scattered throughout the city and represented what was considered to be a random sample for purposes of this study.

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1. A dwelling unit was considered an abode, regardless of size or structure, where one or more individuals, without regard to relationship, maintained living and eating quarters.
2. This map of Logan was prepared by the Logan City Planning Commission under the direction of Smeath, Allred, and Frehner, Planning Consultants. The map was released by the Planning Commission in June 1949. It represented the latest and most complete census of Logan since the U. S. Government census in 1940.
3. The report of Smeath, Allred, and Frehner, Planning Consultants, indicates that there were 4677 dwelling units within the city not including trailers and multiple housing units at the College.

MAP OF LOGAN CITY
CACHE COUNTY
UTAH

Scale

RIVER HEIGHTS

Figure 1. Areas colored greem were surveyed.

Method of Enumeration

The questionnaire used in the study was arranged in a manner that was considered the most logical method of approach to get the desired information without injecting undue bias. Particular attention was given in the questionnaire to getting information concerning changes in consumption during the periods of price fluctuation. Some of the questions were arranged and designed to give a cross check on answers so that maximum accuracy could be obtained. The questionnaire was designed to give primarily two different kinds of data: (1) information that could be used in studying the elasticity of demand for milk, and (2) information that indicated consumer preferences and consumption patterns. Some secondary questions, such as income, family size, and occupation were added because of their influence and effect in determining levels of milk consumption and the elasticity of demand for milk.

Most of the questions used were worded so that the past experience and actual practice of the consumer could be used as a basis for answering. There were, however, some subjective questions where the opinion and judgment of the consumer were required in trying to obtain their attitude concerning the questions asked. Some of the information requested was based partially upon memory of past practices. In no case was that period longer than two months. This information was of such nature that it was felt that the consumer especially the housewife, could give reasonably accurate answers.

The enumeration was conducted by three enumerators who were instructed as to proper procedure and approach in advance of the survey. They were instructed to call at all dwelling units within the blocks selected and make a record of the units contacted so that a call back could be made if the occupants were away from home or did not answer

the door at the first call. One call back was made where no record was obtained during the initial visit. The questions were asked in the order shown on the questionnaire. (See appendix.) Excellent cooperation was received from practically all families interviewed. Refusals to answer the questions were extremely rare. Where uncertainty or lack of information in answering the question was encountered, it was marked "Don't Know" with the exception of questions about income. Where uncertainty or other reasons prevented the interviewed persons from giving income information, they were asked to classify themselves into high, medium, or low income group. About fifteen percent of the income figures were estimated by the enumerator where the information was not forthcoming from the consumer. These estimates were based upon occupation and physical appearance of the dwelling unit of the occupant.

Records taken were edited for completeness and accuracy on the day they were taken. About eight percent of the records taken were discarded because of incompleteness or errors based on information given by the consumers.

Method of Analyzing

The data contained on the questionnaire were tabulated and put on cards for sorting and tabulating by use of International Business Machines. Some of the information was hand-sorted and tabulated where the variables did not justify a machine operation. Tabular analysis was used as the method of presenting the results and showing the relationships that were found to exist.

The reliability and results of this study can be judged on the number of consumers surveyed. The 405 records used in the study include a population of 1455 people, or approximately one tenth of the population of Logan. Since the number of persons included in the survey is

comparatively large in relation to the total population, quantitative analysis was given special emphasis in presenting data from the survey. The nature and limitations of the data collected preclude rigid and definite statements of results. However, it is the author's opinion that the results obtained represent the responses, attitudes and opinions of the consumers surveyed. It is also believed that the results could be expanded to represent the consumers of the city of Logan.

FLUID MILK PRICES

Milk Price War

Fluid milk prices are not generally subject to great or frequent fluctuations. The price of fluid milk at retail levels in Logan was established at rather uniform prices for most of 1949. The price was comparable with prices in the Ogden and Salt Lake markets (table 1).

Table 1. Average retail price in cents per quart for fluid milk in United States, Salt Lake City and Logan, Utah, 1924-1949

Year	U.S.[1]	Salt Lake City[2]	Logan[3]
1924	13.4		8.0
1925	13.9		9.0
1926	14.0		9.0
1927	14.1		10.0
1928	14.2		10.0
1929	14.4		10.0
1930	14.1		8.0
1931	12.6		8.0
1932	10.7		9.0
1933	10.4	10.0	9.0
1934	11.2	10.0	7.0
1935	11.7	10.0	8.0
1936	12.0	10.5	7.5
1937	12.5	11.0	10.0
1938	12.5	10.6	7.0
1939	12.2	10.7	9.0
1940	12.8	10.0	9.0
1941	13.6	10.4	8.0
1942	15.0	12.2	10.0
1943	15.5	13.0	10.0
1944	15.6	13.0	10.0
1945	15.6	13.0	10.0
1946	17.6	14.8	12.0
1947	19.6	17.1	16.0
1948	21.6	19.0	18.0
1949	20.6	19.0	18.0

1. The Dairy Situation Reports, U. S. Dept. of Agriculture, January 1949, table 35.
2. Dairy and Poultry Market Statistics series, U. S. Dept. of Agriculture, 1935-1949.
3. Records of the Utah State Agricultural College, Dairy Department. Prices shown were generally one cent cheaper than delivered price of milk.

The established price in Logan was nineteen cents per quart for delivered milk and eighteen cents per quart for milk sold to consumers through retail stores. Beginning October 7, 1949, competitive forces within the Logan area precipitated a milk price war for a duration of twelve days until October 19, 1949. During the milk price war it was possible to buy either store or delivered milk at greatly reduced prices. As far as could be determined, all dairies in the area sold milk at reduced prices. However, the price war was conducted in such a manner that the prices varied somewhat between the various dairies. During the milk price war the price dropped as low as eleven cents per quart for milk at retail stores and twelve cents per quart for home delivered milk. The most common price was twelve cents per quart for milk sold through stores and thirteen cents per quart for delivered milk.

News of the price changes in milk was not given widespread publicity. On October 8, 1949, the local newspaper[1] carried an article mentioning the milk price war. It indicated the dairies and other organizations were participating in the war and some of the forces that brought it about. It announced that the price of milk had been reduced to thirteen cents per quart from a previous price of nineteen cents per quart for delivered milk. During the milk price war two letters to the editor were published expressing personal views about the milk price war. On October 20, 1949, the newspaper carried an article announcing that the milk price war was over and that the dairies and organizations had settled their differences. It announced that retail prices had been set by mutual agreement at eighteen cents per quart for milk that was delivered to the home. Brief mention of the milk price war was made in

1. Herald-Journal, Logan's daily newspaper.

some of the newspapers published outside of Logan. As far as could be determined, these were the only recognized public notices of the milk price war.

Open and obvious competitive action was not noticeable to the general public during the price war. Some intensive soliciting was done in certain areas of the city to get business at the reduced prices, but it was not a general practice. Activity at the stores consisted mostly of marking down the price at the reduced levels without undue display or sales programs. No great effort was exerted by either storekeepers or clerks to increase the sales volume of milk. Other than the effects of the newspaper report, it appeared that the news of the milk price war spread by consumers being made aware by visiting grocery stores or by talking to their milkman or milk dealer. After the initial period it was evident that work of mouth carried the news to friends and neighbors.

Consumer's Knowledge of Milk Price War

Some consumers went through the entire period of the price war without learning that the price of milk had been greatly reduced. This was true where people had their milk delivered and did not happen to talk to the milkman or others who were acquainted with the war. Since most of the delivered milk is billed once a month, most consumers did not get a milk statement until after the milk price war was over. It was also possible to get milk from the store and not know about the price changes. This was especially true where the consumer had a charge account and ordered his groceries by phone and had them delivered.

Eighty-eight percent of the consumers interviewed indicated that they were aware of the change in the price of milk during the time of the milk price war (table 2). Four percent said they did not know about

the milk price war, and eight percent made no answer to the question or were not specific enough that their answer could be classified. This group of eight percent includes those families who indicated that they found out about the price changes after the milk price war had been concluded. The knowledge consumers had of the price changes in milk enabled them to be motivated by the forces of price if they were so inclined. Because of this fact, a major portion of the further analysis of this study is concerned with the 358 consumers who were aware of the price change.

Table 2. Number and percentage of families who knew of milk price war, 405 families, Logan, Utah, 1949

Knowledge of milk price war	Number of persons	Percent of total
Knew of price change	358	88
Did not know of price change	16	4
No answer and other	31	8
Total	405	100

Consumer's Reaction to Fluid Milk Prices

The price of fluid milk is comparatively stable in relation to prices of other food commodities (figure 2). Most fluid milk prices have some elements of administrative control which tends to bring about less fluctuations than prices set by the free forces of supply-and-demand. Although production on the farms is very seasonal, and demand experiences some variation with season, still the price generally is set without the full effect of supply-and-demand adjustments.

This study recognises the fact that the period of the milk price war was of such a duration and nature that complete adjustments and changes in consumption probably did not take place. Some consumers were not affected at all by the price changes that would have made considerable change in milk consumption had they felt that the price changes were

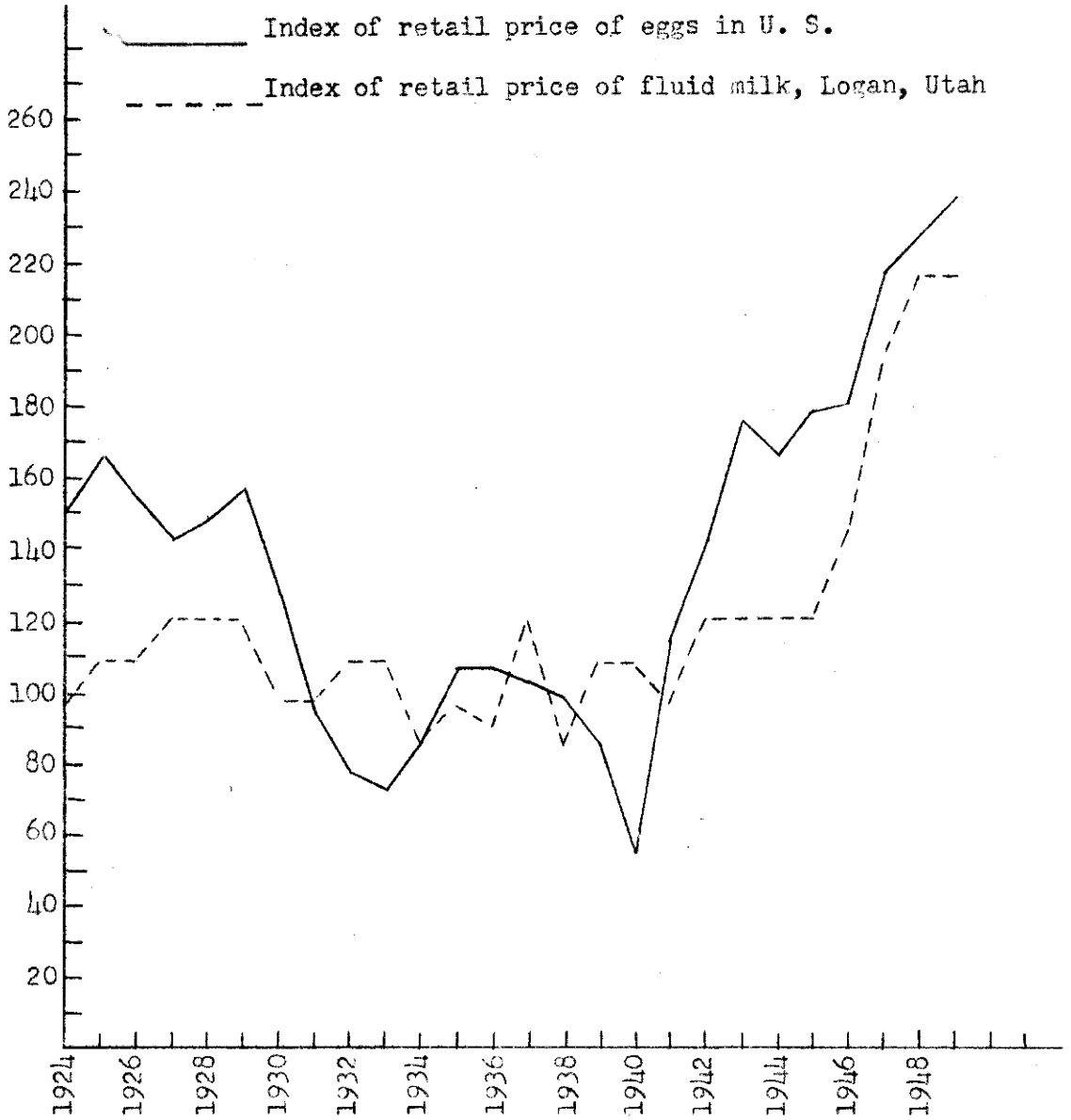

Figure 2. Index of retail prices of eggs sold in the United States and fluid milk sold at Logan, Utah, 1924-49. 1935-39 = 100

Source: Egg prices from Poultry and Egg Situation, U. S. Department of Agriculture, February and October, 1949.
Milk prices from record of Utah State Agricultural College dairy department.

representative of more nearly normal conditions. Other consumers likely overstocked, feeling that they were taking advantage of a temporary situation. Regardless of the opinions and inclinations of individual consumers, it should be emphasized that no one knew in advance the duration of the milk price war. As it happened, it was of a rather short duration. However, elements were so involved that the price war could have extended over a considerable longer period of time. Some of the consumers interviewed, who had no knowledge of production and marketing costs, thought that the price decline represented competitive forces that justified reductions in price to the levels established during the milk price war. They expressed themselves as feeling that these prices were, or should be, of a permanent nature.

If price is an important factor in determining milk consumption, then purchases and consumption should reflect that condition regardless of the fact that a price war was involved. One thing was certain, the price of milk was drastically reduced and it was available at these reduced prices to all consumers who cared to make additional purchases. To those consumers that knew about the price change, on the basis of price alone, there was available every force needed to induce them to adjust milk consumption and purchases. If forces other than price are important in determining consumption, it would seem desirable to discover or recognize these forces so that they might be given consideration. It would seem that the dairy industry would be doing a service to society as well as to itself if it could provide ways and means of increasing milk consumption. Price considerations should be given special emphasis to the point that they are effective in increasing milk consumption and justified economically. After this point is reached, the other factors and their combination with price should be given special consideration.

CONSUMPTION OF AND EXPENDITURE FOR MILK

Consumption

Price has always been considered one of the most important factors determining the amount of milk consumption for most consumers. Nevertheless, its influence and effect are difficult to measure. Because of the many variable factors involved in determining milk consumption, it has been difficult, if not impossible, to isolate the factor of price and to determine its effects alone. In many instances price changes bring about shifts in the method of purchasing that appear to be consumption changes. Consumers are eager to purchase their milk, other things being equal, at the cheapest possible price. It is logical to believe that if they can obtain their milk from one deliveryman for a cheaper price than from another, price considerations would cause them to shift to the lower priced source. The greater the price differential, the greater the incentive to shift to the lower priced milk. Likewise, varying price differentials between store and delivered milk cause changes in the method of purchasing by the consumer. Many of these changes come about so that they appear to be changes in rates of consumption, when in reality they are shifts in place of purchase that have not materially affected consumption levels.

To overcome this difficulty in this study, all the sources of milk supply were considered together, and consumption changes noted. Greater consumption per family was found to exist during the milk price war; this could be attributed to the lowered prices. With all families considered together, there was an increase in family weekly consumption from 13.6 quarts to 14.8 quarts during the milk price war over weekly

consumption rates prior to the milk price war (table 3). Families who were aware of the milk price war increased their per family milk consumption one and three tenths quarts, whereas, those who were not aware of the milk price war maintained their consumption rates at almost a constant level. It should be noted that the sixteen families interviewed who did not know about the price change in milk had a much smaller consumption rate than those that did know about the milk price war. Their low consumption rates of milk may account, in part, for their lack of knowledge about the price of milk. However, the number involved is too few to merit any further analysis.

Table 3. Relation of the family weekly consumption of fluid milk to the knowledge consumers had of the milk price war, 405 families, Logan, Utah, October 1949

Knowledge of milk price war	Number of families	Percent of total	Weekly family milk consumption		
			Before price war	During price war	After price war
			quarts		
Knew of milk price war	358	88	13.9	15.2	13.9
Did not know of milk price war	16	4	8.7	8.6	8.5
No answer and other	31	8	13.7	14.0	13.6
Total	405	100			
Weighted average			13.6	14.8	13.6

The thirty-one families that gave no definite answer as to knowledge of the milk price war included many families that had their own cow, or bought their milk from sources other than regular commercial channels. Their consumption level per family is comparable to the consumption levels for families that were informed about the price change. This group showed very little inclination to increase its milk consumption because of the decreased price.

It is interesting to note that after the prices had been established again at higher levels, consumption dropped off to almost the same level that it was previous to the milk price war. (See figures 3

and 4). This was true, notwithstanding the fact that a compromise between milk dealers and others concerned with the milk price war established a price that was one cent a quart cheaper than had existed before the price war. This circumstance would indicate that the reduction in price of one cent per quart had very little effect on milk consumption. This result is consistent with the results reported by H. A. Ross (20) on the New York milkshed.

When consumption of milk is related to family size, there is a consistent increase in quantities of milk consumed with an increase in number of persons in the family (table 4). During the period of the milk price war there was an increase in quantities of milk consumed for all families regardless of size. Families with six and more persons showed a greater increase in quantities of milk consumed during the milk price war than families with fewer persons.

Table 4. Relation of family size to consumption of fluid milk, 358 families, Logan, Utah, 1949

Number of persons in family	Number of families	Weekly family milk consumption		
		Before price war	During price war	After price war
		quarts		
1	23	3.5	3.9	3.3
2	80	5.9	6.6	5.9
3	77	12.4	13.8	12.4
4	82	15.8	17.2	15.7
5	49	18.5	19.9	18.6
6	27	21.5	23.8	21.3
7 and over	20	28.6	30.5	28.7
Total	358			

Per capita consumption rates for milk were highest in families consisting of three persons (table 5). Families composed of two persons have the lowest consumption rates of milk. Per capita rates of milk consumption do not seem to show any decline with large families. In fact the consumption rates were higher for families with seven and more

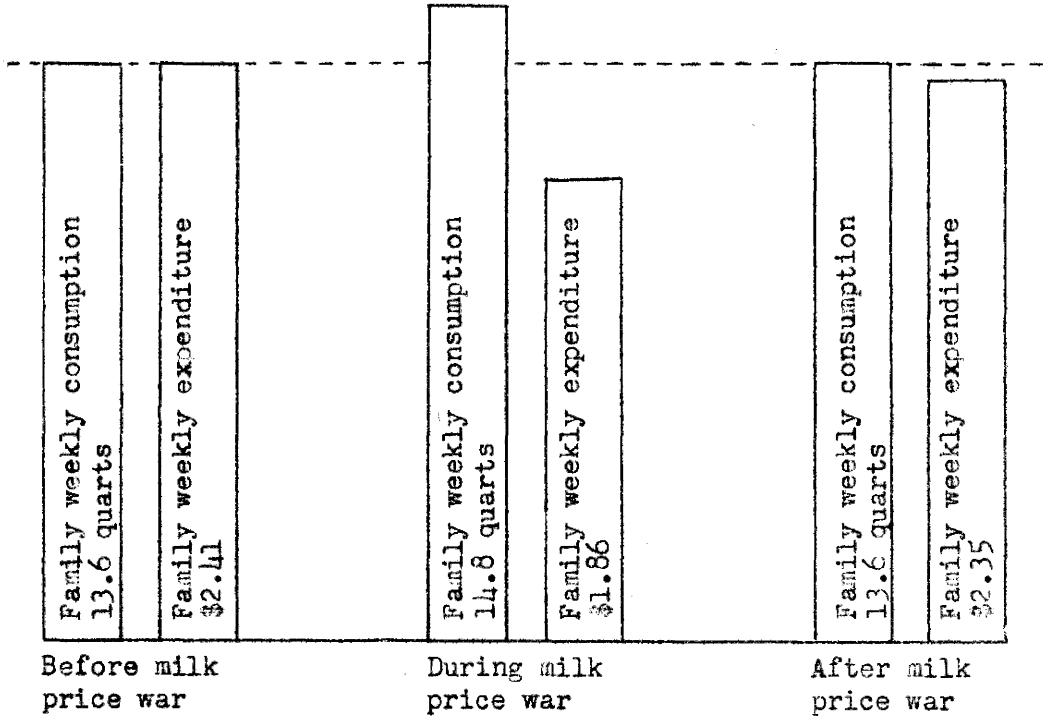

Figure 3. Weekly family consumption of and expenditure for fluid milk before, during, and after milk price war, Logan, Utah, 1949

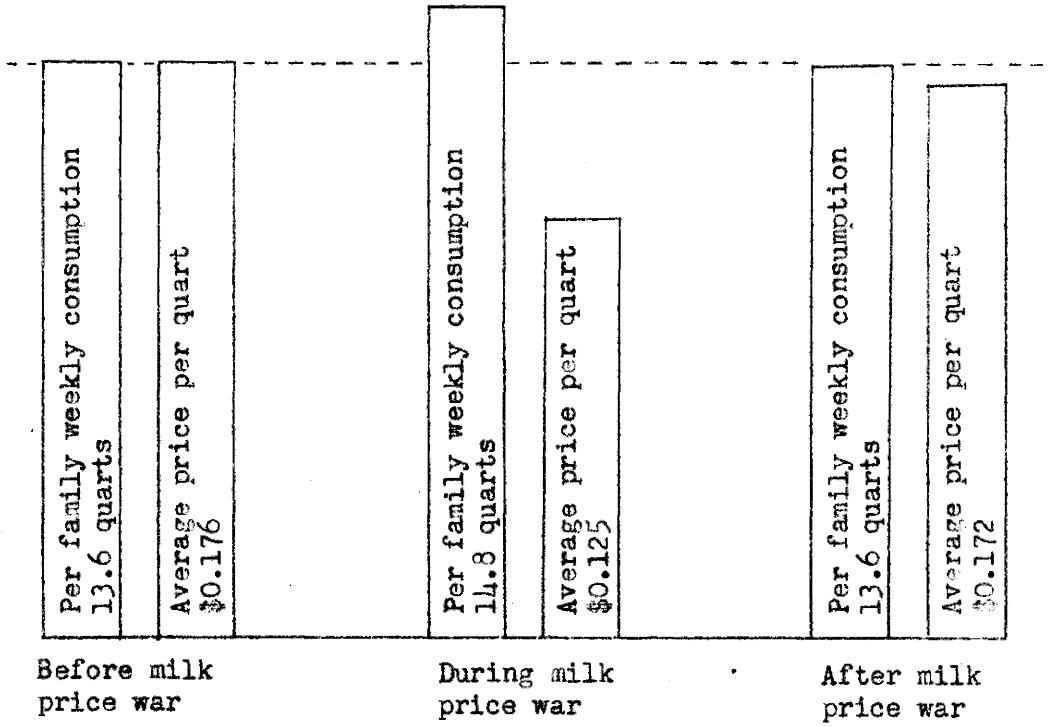

Figure 4. Weekly per family consumption of fluid milk and price per quart before, during, and after milk price war, Logan, Utah, 1949

persons than they are for families with one and two persons. The per capita consumption rate was approximately one pint per day. This consumption rate would be equivalent to a per capita fluid milk consumption of about 386 pounds per year. Per capita consumption of fluid milk and cream for the United States as a whole was around 382 pounds[1] in 1949. Since the consumption of cream was not considered in the study, it would appear that the per capita consumption rates for Logan are slightly higher than the national average.

Table 5. Relation of family size to per capita weekly consumption of milk before price war, 358 families, Logan, Utah, 1949

Number of persons in family	Number of families	Avg. number children in family[2]	Avg. number adults in family	Per capita consumption (quarts)
1	23	0	1	3.5
2	80	0	2.0	2.9
3	77	.8	2.2	4.1
4	82	1.8	2.2	3.9
5	49	2.6	2.4	3.7
6	27	3.5	2.5	3.6
7 and over	20	4.3	3.7	3.6
Total	358			

Expenditure

Measured on an expenditure basis, it was found that those families that knew about the milk price war had the greatest absolute decrease in total family expenditure for milk (table 6). Weekly family expenditures for this group declined from $2.49 to $1.90. This represented a twenty four percent decrease in expenditure and about a ten percent increase in purchases. Although the decrease in expenditure is fifty-nine cents per family per week, the quantity of milk purchased increased one and three-tenths quarts per week.

1. Dairy Situation, U. S. Department of Agriculture, January 1950.
2. For purposes of this study persons under 20 years of age were considered to be children.

Expenditures for the families that indicated they did not know about the milk price war were reduced by forty-three cents per family per week. This represented a twenty-eight percent decrease in expenditure. Consumption levels for this group were practically the same during the milk price war as they were previous to the price changes. The percent decrease in expenditures is high, not because of a great absolute decrease in expenditure, but because of a small total expenditure by this group for milk.

The thirty-one families that were indefinite about the price changes decreased their expenditure by twenty-six cents per family per week. They purchased three tenths of a quart more milk during the milk price war. This represented a thirteen percent decrease in expenditure and a two percent increase in consumption. In relation to changes made by the 358 families, the changes for this group were small. This again shows the effects of milk obtained from sources other than store or delivered purchases.

All the families considered together reversed their patterns at the termination of the milk price war. Consumption decreased to the same level it was before the milk price war, but weekly expenditures increased to $2.35 per family per week. This was an increase of forty-nine cents per week per family over amounts spent during the price war

Table 6. Relation of the per family weekly expenditure for fluid milk to the knowledge consumers had of the milk price war, 405 families, Logan, Utah, 1949

Knowledge of milk price war	Number of families	Percent of total	Weekly family expenditures		
			Before price war	During price war	After price war
Knew of milk price war	358	88	$2.49	$1.90	$2.42
Did not know of milk price war	16	4	1.55	1.12	1.51
No answer and other	31	8	1.99	1.73	1.98
Total	405	100			
Weighted average			2.41	1.86	2.35

for a like period of time. In spite of this increase in expenditure, one and two-tenths quarts less milk was purchased.

Considering only the 358 families that were affected most by the price changes, total weekly expenditures for milk for the group decreased $211.00. However, milk consumption increased by 465 quarts. Valuing this increased consumption of milk at eighteen cents per quart, it would represent a value of $83.70. The weighted average price of milk from all sources for the period just preceeding the milk price war was about 17.5 cents per quart. The average price of delivered milk for the same period was 18.7 cents per quart, while the average price for milk purchased at stores was about eighteen cents per quart. This compares with a national average of 21.1 cents per quart for delivered milk in October 1949 (9). It is apparent that milk purchased from sources other than delivered or the store had a considerable influence on lowering the average price for all milk in the city of Logan.

METHOD AND SOURCE OF PURCHASE

One of the more controversial subjects in the dairy industry today is the method of distributing fluid milk. The evolution of the milkman occurred primarily as a necessity because of the extreme perishability and bulkiness of milk. Lack of refrigeration facilities in past years made frequent, if not daily, deliveries a necessity. Developments during the last two decades have altered those conditions greatly. Better sanitation and processing techniques have contributed toward making milk a less perishable food. The development and use of single-use containers has done much to eliminate part of the bulkiness in milk distribution. Not only do the fiber containers weigh less, but they eliminate the former necessity of returning glass containers to the dairy. Numerous studies have shown that the service provided by the milk deliveryman adds very substantially to the total cost of milk to the consumer (6, 23), especially when the quantity delivered per consumer is small. The present trend is for consumers to purchase their milk at stores. This trend is especially noticeable in large cities. In smaller cities the trend does not seem to be as noticeable. To add to this trend, competitive forces are establishing an increasing price differential favoring store-purchased milk.

About forty-seven percent of the consumers contacted in this study were having all their milk delivered to their homes by regular route milkmen. Thirty-five percent of the families were buying all the milk they purchased from the store. Six percent of the families were obtaining all of their milk from other sources. Nine percent of the consumers were on a regularly scheduled delivery route, but supplemented their delivered purchases with milk purchased from the store. People using

milk from "other sources" did very little supplementary purchasing of milk from either delivered or store sources (table 7).

Table 7. Number of families purchasing milk from various sources, 405 families, Logan, Utah 1949

Source of purchase	Number of families	Percent of total
Store	141	35
Delivered	190	47
Store and delivered	38	9
Store and other	7	2
Delivered and other	3	1
Other	26	6
Total	405	100

Delivered milk accounted for fifty-three percent of the total volume of milk used by consumers. Thirty-four percent of the total volume was purchased at a store and thirteen percent came from "other sources" (table 8). Since the percentages are comparable for periods both preceeding and after the price war, it would seem logical to assume that these relationships represent the normal sources of purchase. This compares with seventy-two percent sold through stores and twenty-eight percent sold through home delivery in New York City.

Table 8. Relation of total milk consumed, to method of purchase, 405 families, Logan, Utah, 1949

Source	Before war		During war		After war	
	Quarts	% of total	Quarts	% of total	Quarts	% of total
Store	1887	34	2356	39	1883	34
Delivered	2929	53	2988	50	2930	53
Other	729	13	673	11	735	13
Total	5545	100	6017	100	5548	100

The amount of milk classed as "other sources" is fairly high. This can be explained, in part, by the large number of cows kept within the city limits and the close proximity of the city to producing areas.

According to a report made by Smeath[1] and associates, there were 537 cows within the city limits of Logan in the spring of 1949. Some small producing herds within the city limits produce for local processors, but a great portion of the number represents cows used for producing family milk. Much of the excess above the family needs is sold to neighbors and friends.

During the period of the milk price war, some definite shifts were made in method of purchasing milk. The price differential between delivered and store milk remained at the same level of one cent. The noticeable tendency to increase store purchases of milk contrasted sharply with very little change in delivered milk. The total quantity of milk delivered during a week of the milk price war showed a fifty-nine quart increase. Many people supplemented their regular delivered volume with milk bought at the neighborhood store. This would indicate that these people would prefer to adjust to the price decrease in this manner rather than order extra milk from their regular deliveryman. Some of the increase can be explained by the additional purchases by consumers who were already getting their milk from the store rather than having it delivered. There was a small decrease in the percent of milk coming from other sources. This probably indicates that the milk bought in this category was supplementary milk as well as some shifting in source because of reduced prices of delivered and store milk.

Expressed in percentages, delivered milk increased from 2929 to 2988 quarts, a two percent increase for the period. Store purchased milk increased from 1887 to 2356 quarts, an increase of 24.8 percent. This increase would indicate that store purchased milk is much more responsive to price change than is delivered milk. The increase is

1. Smeath, Frehner, and Clay compiled a map showing animal population for Logan which was submitted to the Logan Planning Commission.

probably explained because of the ease in varying purchases of store-purchased milk. Changing purchases of delivered milk involves contacting the milkman or the dairy and requesting the change be made. It usually involves putting out extra bottles and other inconveniences. All this seems to meet resistance from the consumer which causes him to forgo changes. Dairies and route milkmen prefer to have delivered milk consumption fairly constant because it makes distribution and planning easier. Their sales programs are based largely on this practice so that fluctuating deliveries are discouraged.

MILK CONSUMPTION AND INCOME

Income is a very important factor in determining milk consumption. Investigational work has shown that a change in income invariably brings about a change in the consumption of milk (6, 23).

There appears to be a rather consistent relationship between family milk consumption and income (table 9). At all income levels except two, milk consumption increased as income increased for the three periods studied. For the periods before and after the milk price war, there was a consistent relationship with income until income reached an annual rate of $3900 per family. There was a slight decrease in consumption for the two income groups above $3900. The group of families with incomes over $6000 per year had the highest fluid milk consumption of all groups considered. It appears that families having incomes of more than $3300 per year buy about all the milk that they care to consume at a set price, so that consumption levels are not changed greatly by an increase in income above this point. However, reducing price might increase consumption. The group of families with incomes less than $1000 per year have extremely low consumption rates. Apparently, their income level does not provide sufficient money to buy the milk they need, or else they forego the consumption of milk in favor of other expenditures that they deem more essential.

All income groups increased consumption of milk during the period of reduced prices, except families with incomes over $6000 (figure 5 and table 10). The percent increase for the families purchasing additional milk varied from seven percent to sixteen percent. There does not seem to be any consistent correlation between income and increased consumption,

Table 9. Relation of income to family composition and family weekly milk consumption before, during and after milk price war, 358 families, Logan, Utah, 1949

Income group (dollars)	Number of families	Average family income	Average number children	Average number adults	Average number persons	Consumption in quarts		
						Before price war	During price war	After price war
0 - 1000	29	$ 770	0.10	1.48	1.58	4.7	5.2	4.7
1001 - 1500	40	1361	0.80	2.05	2.85	10.4	12.1	10.5
1501 - 2100	55	1833	0.93	2.07	3.00	10.8	11.7	10.7
2101 - 2700	49	2404	1.63	2.18	3.81	13.2	14.5	13.2
2701 - 3300	51	3031	1.90	2.35	4.25	16.2	17.4	16.2
3301 - 3900	46	3583	2.06	2.41	4.47	18.0	19.2	17.8
3901 - 4500	39	4128	1.64	2.66	4.30	17.1	19.1	17.2
4501 - 6000	34	5265	1.73	2.32	4.05	16.4	18.7	16.5
6001 - over	15	8572	2.06	2.47	4.53	20.3	20.3	20.3
Total	358							

Table 10. Relation of income to absolute and percent increase and decrease in family weekly milk consumption during and after the milk price war, 358 families, Logan, Utah, 1949

Income group (dollars)	Number of families	Increased consumption during milk price war compared to previous period		Decreased consumption after milk price war compared to previous period	
		quarts	% increase	quarts	% decrease
0 - 1000	29	0.5	11	0.5	10
1001 - 1500	40	1.7	16	1.6	13
1501 - 2100	55	0.9	08	1.0	08
2101 - 2700	49	1.3	10	1.3	09
2701 - 3300	51	1.2	07	1.2	07
3301 - 3900	46	1.2	07	1.4	07
3901 - 4500	39	2.0	12	1.9	10
4501 - 6000	34	2.3	14	2.2	12
6001 - over	15	0	0	0	0
Total	358				

except that there was a small general increase for eight of the nine groups. No particular income levels were effected more than others.

After the milk price war terminated and prices advanced again, consumption by all income groups returned to about the same levels that were maintained before the milk price war. In no instance was there a greater variation than two tenths of a quart for any of the income groups before and after the milk price war. This would indicate that all income groups curtailed consumption to practically the same level that existed prior to the milk price war.

Expenditure for milk related to income follows the same general pattern as does consumption, since expenditure is determined by quantities used multiplied by the price. There was a decrease in expenditures for the period after the milk price war compared to the period before the price war. This decreased expenditure is the result of the one cent decrease in the price of a quart of milk between the two periods, rather than a decrease in consumption (table 11 and figure 6).

Expressed in percent, changes in consumption because of price

Table 11. Relation of income to family weekly expenditure for milk before, during and after milk price war, 358 families, Logan, Utah, 1949

Income group (dollars)	Number of families	Weekly family expenditure		
		Before price war	During price war	After price war
0 - 1000	29	$0.87	$0.68	$0.84
1001 - 1500	40	1.87	1.53	1.87
1501 - 2100	55	1.92	1.44	1.86
2101 - 2700	49	2.39	1.84	2.29
2701 - 3300	51	2.77	2.14	2.74
3301 - 3900	46	3.19	2.40	3.09
3901 - 4500	39	2.93	2.32	3.00
4501 - 6000	34	2.95	2.34	2.91
6001 - over	15	3.83	2.67	3.67
Total	358			

variation was always smaller than the changes in expenditure (table 10 and 12). This allowed the absolute and percent variations for the price changes to follow the same pattern as consumption did when related to income.

When income and method of purchase were related to consumption, delivered purchases seemed to have a much more consistent relationship

Table 12. Relation of income to absolute and percent decrease and increase in family weekly fluid milk expenditure because of milk price war, 358 families, Logan, Utah, 1949

Income group (dollars)	Number of families	Decreased expenditure during milk price war compared to previous period		Increased expenditure after milk price war compared to previous period	
		$ decrease	% decrease	$ increase	% increase
0 - 1000	29	$0.21	24	$0.16	19
1001 - 1500	40	0.34	18	0.34	18
1501 - 2100	55	0.48	25	0.42	22
2101 - 2700	49	0.55	23	0.45	20
2701 - 3300	51	0.63	23	0.60	22
3301 - 3900	46	0.79	25	0.69	22
3901 - 4500	39	0.61	21	0.68	23
4501 - 6000	34	0.61	21	0.57	19
6001 - over	15	1.16	30	1.00	27
Total	358				

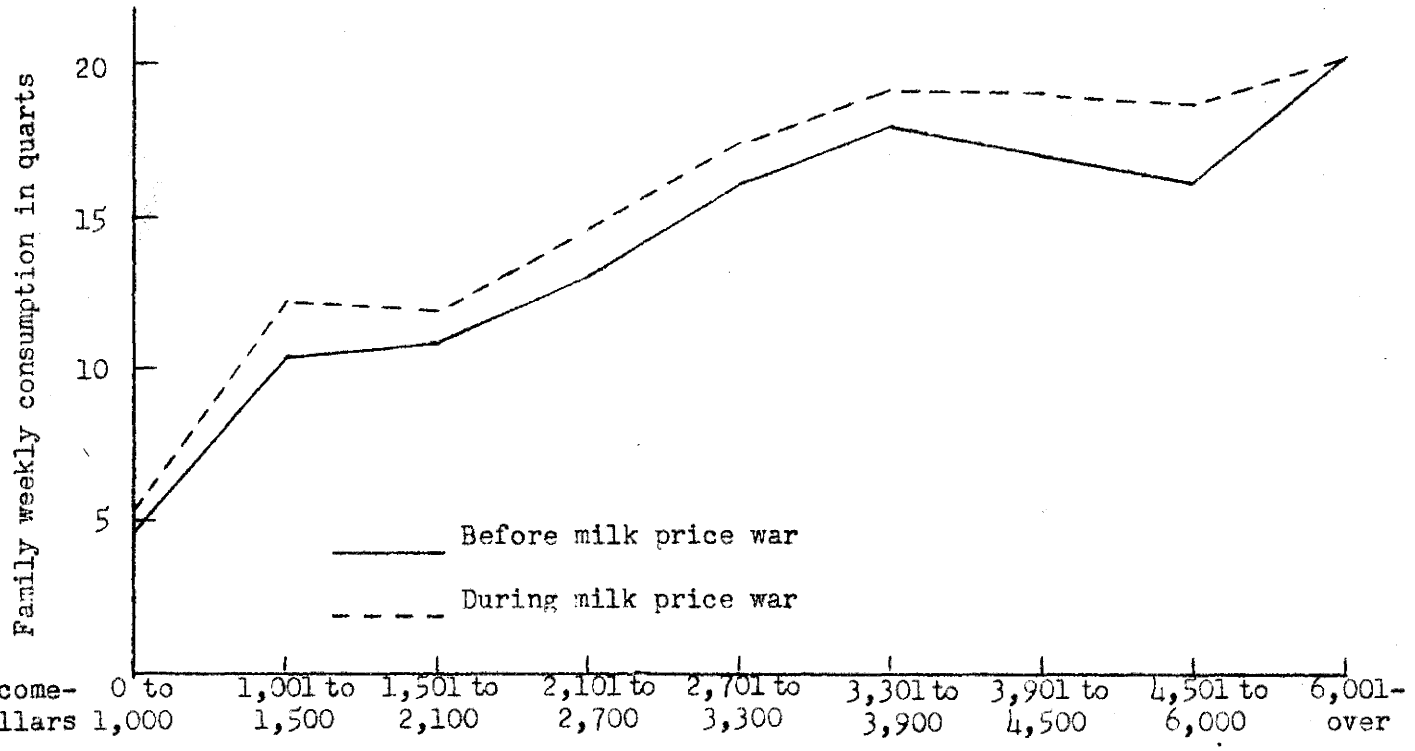

Figure 5. Relation of family income to weekly family consumption of fluid milk before and during milk price war, Logan, Utah, 1949.

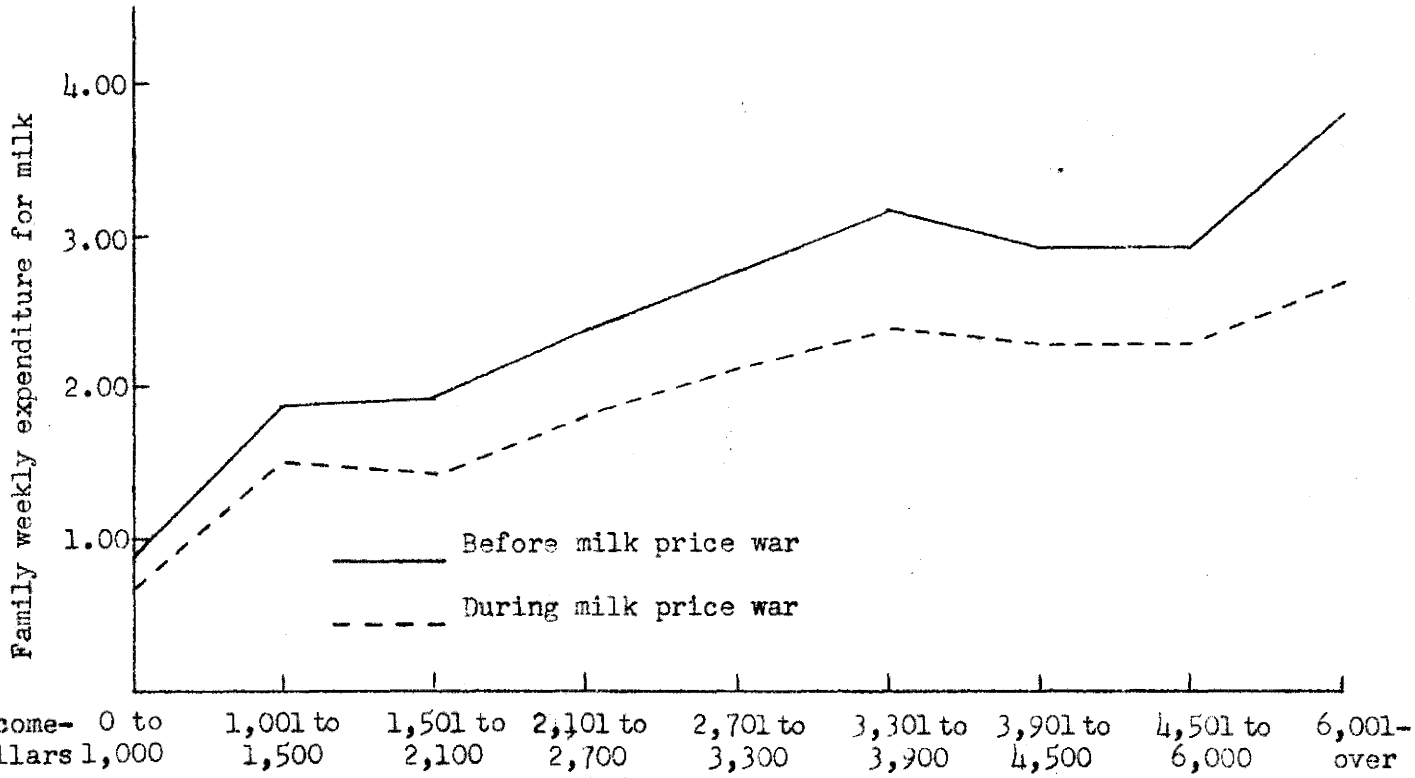

Figure 6. Relation of family income to weekly family expenditure for fluid milk before and during milk price war, Logan, Utah, 1949.

to income than did the other methods of purchase (table 13). The consumption pattern for delivered purchases followed about the same rela-

Table 13. Relation of income and source of purchase to family weekly consumption, 358 families, Logan, Utah, 1949

Income group (dollars)	Number of families	Before price war	During price war	After price war
		quarts		
		Store purchases		
0 - 1000	29	1.5	1.9	1.5
1001 - 1500	40	6.9	8.4	6.8
1501 - 2100	55	5.2	6.1	5.0
2101 - 2700	49	4.4	6.0	4.8
2701 - 3300	51	5.1	6.0	4.8
3301 - 3900	46	4.8	5.9	4.5
3901 - 4500	39	7.0	8.7	7.0
4501 - 6000	34	6.3	8.7	6.3
6001 - over	15	2.7	2.7	2.7
Total	358			
		Delivered purchases		
0 - 1000	29	2.9	3.1	3.0
1001 - 1500	40	3.3	3.9	3.4
1501 - 2100	55	4.5	4.7	4.8
2101 - 2700	49	7.7	7.9	7.2
2701 - 3300	51	7.7	7.9	8.0
3301 - 3900	46	11.0	11.2	11.2
3901 - 4500	39	8.9	9.1	8.9
4501 - 6000	34	9.1	8.9	9.2
6001 - over	15	17.5	17.5	17.5
Total	358			
		Other purchases		
0 - 1000	29	0.1	0.1	0.1
1001 - 1500	40	0.2	0.1	0.2
1501 - 2100	55	0.9	0.8	0.8
2101 - 2700	49	1.0	0.3	1.4
2701 - 3300	51	3.0	3.0	3.3
3301 - 3900	46	2.1	1.9	2.0
3901 - 4500	39	1.3	1.3	1.3
4501 - 6000	34	1.0	1.0	1.0
6001 - over	15	0.0	0.0	0.0
Total	358			

tionship to income as did total consumption. Purchases of delivered milk decreased in the $3901-6000 income groups. These groups showed a great increase in purchases from stores. With this shift in method of

purchase, consumption levels were fairly high for these groups.

Family purchases of store and other milk seemed to have very little correlation with income. There was a great increase in consumption levels from other sources when income reached the $3000 class. It fell sharply again when incomes reached $4500. This indicated the presence of family cows in these groups. The cost of purchasing, maintaining and feeding a family cow is substantial. The data collected indicated that this expense and trouble were not entailed until income reached moderate proportions. When the family cow is purchased, consumption levels are fairly high, as most cows can produce in excess of the usual family requirements. Consumption levels for this source of milk in the higher income levels indicated that these families would prefer to buy their milk commercially rather than be troubled with the inconveniences and expense involved in keeping a cow.

There was an increase in rates of consumption for delivered and store purchased milk during the period of decreased prices. People who purchased their milk from other sources had a tendency to decrease consumption levels during this period. This would indicate that there were some shifts toward the purchase of milk from the store at the reduced prices.

When the price of milk decreased, families who had their milk delivered showed a small but uniform increase in purchases for all groups, except the families with incomes over $6000. These families showed no variation in purchases with price changes for any of the sources of supply. Compared to the delivered purchases, store milk showed a substantial increase in quantities purchased. The fluctuations in increased purchases seemed to have no consistent correlation to income groups. With a decrease in price there does not seem to be any tendency for lower income groups to increase their purchases any more than the higher income groups.

ELASTICITY OF DEMAND

Definition

Elasticity of demand is a concept used by economists to refer to measurement of the change in quantity demanded after a change in price. Expressed numerically, the elasticity of demand may be defined as "the percent change in quantity demanded which would result from a one percent change in price" (10, p. 128). When a price change of one percent brings a greater than one percent change in quantity taken, demand is said to elastic. This is true because a given change in price brings about a more than proportional change in quantity taken. Where a one percent change in price is accompanied by a change of less than one percent change in quantity demanded, the demand is said to be inelastic. This is true because the change in quantity demanded is less than proportional to the change in price. If a one percent change in price brings about a one percent change in quantity demanded, then the changes are said to be proportional. Unit elasticity is the term applied to this condition.

Elasticity of demand affects total revenue or receipts for products sold. If the sale of additional items increases the amount of total revenue, then the demand is said to be elastic. If additional unit sales decrease the total revenue, then the demand is said to be inelastic. If the total revenue remains the same with a decrease in unit selling price, then the demand is said to be proportional or to have unit elasticity.

There is a great difference in the way that various commodities respond to a change in price. Reducing the price slightly of some commodities, like bananas, will result in a large increase in the quantity

demanded. Other commodities, like salt, have nearly the same rate of consumption at a low price as they do at a high price. In studying the marketing and production of any commodity, it is important to know what the elasticity of demand is for the product. This enables formulation of policies and programs based upon facts and reason instead of speculation and chance.

The measurement of elasticity of demand is not a precise measure, but rather a general or approximate measure. It usually ignores the element of time in its calculation. The time element between the various periods in this study was short. It is assumed that the demand during the different periods studied is not altered greatly by the time interval between them.

Numerous formulas and measures have been used for measuring elasticity of demand. The one used in this study is the generally accepted formula for measuring arc elasticity which is:

$$\text{Arc elasticity} = \frac{\text{Difference in quantity}}{\text{Summation of quantity}} \times \frac{\text{Summation of price}}{\text{Difference in price}}$$

Elasticity of Demand for Milk

An elasticity of demand of 0.25 was found for the 358 families that were aware of the milk price war (table 14). This measure covered the change of price between the periods before and during the milk price war. According to this measure, the demand for milk was found to be relatively inelastic. The change in quantity taken was less than proportional to the change in price. Actually, a one percent change in price brought about a 0.25 of one percent change in quantity taken. The elasticity of demand was 0.26 for the periods during and after the price war when the price of milk advanced. This indicated that for each advance of one percent in the price of milk, consumption decreased 0.26 of one percent.

Table 14. Elasticity of demand for fluid milk for various sources of purchase, 358 families, Logan, Utah, 1949

Period of purchase	Average price	Average consumption	Elasticity
All sources			
Before milk price war	17.6	13.6	
During milk price war	12.5	14.8	.25
After milk price war	17.2	13.6	.26
Store			
Before milk price war	18.0	5.1	
During milk price war	11.7	6.4	.53
After milk price war	17.7	5.0	.60
Delivered			
Before milk price war	18.7	7.5	
During milk price war	13.2	7.6	.04
After milk price war	18.1	7.5	.05

The elasticity of demand for milk purchased at the store was 0.53 for the changes in price between the periods before and during the milk price war. The elasticity was 0.60 for the price changes for the periods during and after the price war. Although the elasticity of demand for store purchased milk was inelastic for all periods and changes, still its value was more than twice as great as for the elasticity values for all sources. This indicates that consumers that purchase milk at stores do change purchases with price change much more than do consumers who purchase from any of the other sources.

Elasticity of demand measures for delivered milk were extremely low. For the price changes during the period before and during the price war, the elasticity of demand was 0.04. Price changes for the periods during and after the milk price war had an elasticity of 0.05. This indicates the very small change in purchases with a change in price for delivered milk. Actually, the elasticity of demand for store milk is over ten times

as great as it was for delivered milk. Speaking in generalities and comparisons, this would mean that ten families would increase their purchases at the store for each family that would increase purchases for delivered milk because of price change. It means that ten quarts of additional milk would be sold through the store for each one sold through the deliveryman. Since the demand for milk is inelastic, a decrease in price means great savings for the milk that the consumer buys. To the producer and distributor it means great losses in total revenue because of the decreased price without much increase in sales.

Relation of Income and Elasticity of Demand for Milk

Elasticity of demand for the 358 families has an irregular pattern when related to income (table 15). In all income groups and for both a decrease and increase in price, the demand for milk was inelastic. Families having higher incomes seemed to be inclined to change their consumption with price as much as the lower income groups. The only group that did not change their consumption at all with price change was the families having annual incomes of more than $6000. For this group, the demand is perfectly inelastic because a change in price produces no change in quantities purchased. The highest elasticity for the income groups was found for the families having an income range of $1001-1500. Income groups immediately preceding and following this group were about an average of all the groups. It is felt that this income group includes a large proportion of veterans and students having families that made unusually large variation in purchases because of price change. The variations in purchases were not large enough, however, to make the demand for milk elastic.

Table 15. Relation of income to elasticity of demand for fluid milk for price change before and during, and during and after milk price war, 358 families, Logan, Utah, 1949

Income group (dollars)	Number of families	Increased consumption (quarts)	Decreased expenditure (dollars)	Percent increase consumption	Percent decrease expenditure	Elasticity
Before-During						
0 - 1000	29	0.5	$0.21	11	24	0.37
1001 - 1500	40	1.7	0.34	16	18	0.75
1501 - 2100	55	0.9	0.48	08	25	0.28
2101 - 2700	49	1.3	0.55	10	23	0.36
2701 - 3300	51	1.2	0.63	07	23	0.28
3301 - 3900	46	1.2	0.79	07	25	0.23
3901 - 4500	39	2.0	0.61	12	21	0.47
4501 - 6000	34	2.3	0.61	14	21	0.56
6001 - over	15	0.0	1.16	0	30	0.00
Total	358					
		Decreased consumption (quarts	Increased expenditure (dollars)	Percent decrease consumption	Percent increase expenditure	
During-After						
0 - 1000	29	0.5	0.16	10	19	0.47
1001 - 1500	40	1.6	0.34	13	18	0.71
1501 - 2100	55	1.0	0.42	08	22	0.34
2101 - 2700	49	1.3	0.45	09	20	0.43
2701 - 3300	51	1.2	0.60	07	22	0.29
3301 - 3900	46	1.4	0.69	07	22	0.30
3901 - 4500	39	1.9	0.68	09	23	0.41
4501 - 6000	34	2.2	0.57	11	20	0.57
6001 - over	15	0.0	1.00	0	27	0.00
Total	358					

CONSUMER PREFERENCES AND PATTERNS

Consumers' Estimate of Fair Price

Many of the past practices and policies of the dairy industry have met with public disapproval. Administrative controls of price and monopoly practices have subjected the industry to great criticism. This has been especially true in some large cities where the number of operating dairies have been few and large. General stability of fluid milk prices has caused some persons to believe that changes in price, especially upward, mean profiteering and unfair business practices.

High levels of milk consumption and the continued advancement of the dairy industry are predicated upon good consumer relations. In the final analysis, the consumer determines the success and growth of the industry. Policies and programs should be based upon an understanding of the consumer's desires and educating the consumer to the problems of the dairy industry. The consumer is happier paying a price for milk which he thinks high if he knows that it is justified in a competitive economy by costs of goods and services rather than selfish business practices.

Forty-nine percent of the families contacted thought that the price of milk in Logan was too high in relation to prices of other foods (table 16). Thirty-nine percent thought the price was about right, and one percent thought it too low. Ten percent did not answer the question or said they did not know.

The number of families who thought the price of milk was too high in relation to other foods comprised about fifty percent of the families in each income group. This would indicate that, regardless of income level, the price was not justified in the minds of approximately fifty

percent of the consumers.

Table 16. Relation of family income to consumers' attitude toward the price of milk in relation to cost of other foods, 405 families, Logan, Utah, 1949

Income group (dollars)	Number of families	Price of milk in relation to other foods				
		Too high	About right	Too low	Did not know	No answer
0 - 1000	34	17	10	1	1	5
1001 - 1500	46	24	19	0	1	2
1501 - 2100	60	28	28	0	0	4
2101 - 2700	56	31	19	1	0	5
2701 - 3300	58	28	20	1	1	8
3301 - 3900	52	25	19	0	1	7
3901 - 4500	43	19	18	1	0	5
4501 - 6000	40	17	19	0	0	4
6001 - over	16	9	5	0	1	1
Total	405	198	157	4	5	41
Percent of total	100	49	39	1	1	10

To the forty-nine percent of the consumers who thought the price of milk was too high in relation to prices of other food, the dairy industry has a great obligation. The size of the group is so large that it should be given consideration. No price is too high if it is justified economically and logically. On the contrary, any price that can not be justified is too high. To earn the good will and understanding of these consumers, one or both of the alternatives must be met.

Homogenized Milk

The introduction and use of homogenized milk is a fairly recent development in the dairy industry. It found its first use in ice cream making and is now widely used in fluid milk processing. Homogenizing milk involves a process that puts the milk under pressure and breaks up the fat globules permanently and distributes them throughout the milk so that no cream line is formed. Many people think that it adds a desired flavor and taste to the milk. Not all the dairies in Logan are equipped to homogenize milk. However, the milk is sufficiently available

at stores and through delivered sources so that if the consumer prefers homogenized milk he can buy it. There was no price differential between homogenized and creamline milk during the study.

Forty-nine percent of the families preferred homogenized over creamline milk. Thirty-eight percent preferred creamline milk, while nine percent had no definite preference between the two (table 17).

Table 17. Relation of income to consumer preference for homogenized milk, 405 families, Logan, Utah, 1949

Income group (dollars)	Number of families	Preferred homogenized milk			
		Yes	No	No preference	No answer
0 - 1000	34	14	13	5	2
1001 - 1500	46	25	13	7	1
1501 - 2100	60	32	22	4	2
2101 - 2700	56	26	22	6	2
2701 - 3300	58	32	22	2	2
3301 - 3900	52	26	15	6	5
3901 - 4500	43	19	18	2	4
4501 - 6000	40	17	20	3	0
6001 - over	16	6	8	2	0
Total	405	197	153	37	18
Percent of total	100	49	38	9	4

Many consumers felt that children preferred homogenized milk over creamline for drinking purposes. Some stated that members of the family drank homogenized milk where they never cared previously for creamline milk. Some consumers used homogenized milk because it was in paper cartons and they preferred to use paper cartons rather than bottles. A few held that homogenized milk was safer from a sanitary point of view.

Creamline milk was preferred by many families because the cream could be skimmed off for use with cereals and for whipping cream. Some people who were dieting to reduce weight preferred creamline milk because they could skim the cream and use the remaining milk in their diets. Some of the consumers contacted did not know the difference

between homogenized and creamline milk. Some thought that pasturization was homogenization. A great number were not familiar with the purpose and claims of homogenization. They had never used homogenized milk to make comparisons.

Related to income there does not seem to be any significant preference for any income groups over other groups for homogenized milk. In most of the income groups, from forty-five to fifty percent of the families preferred homogenized milk.

Paper Containers

In the city of Logan the use of milk in paper and single-use containers in any commercial volume began about 1946. At the present time, there is no dairy in Cache Valley that is equipped to package milk in paper cartons. Most all the milk sold in Logan in paper cartons comes from two dairies in Odgen. One of these dairies has an employee in the city that makes distribution of the milk, while the other dairy distributes through a locally established dairy. All milk in cartons is sold through stores. At present, the use of paper cartons does not seem to be satisfactory for delivered distribution because of leaks and the inability of paper cartons to hold up in delivering milk.

Forty-seven percent of the 405 families preferred milk in glass bottles rather than in paper containers. Thirty-two percent preferred paper containers, while seventeen percent had no definite preference for either packaging method (table 18). Some of the consumers contacted had not used milk in paper cartons.

The reasons for preferring glass bottles were varied. Some preferred glass bottles because they could see the milk and tell of its quality and creamline. Others said that milk from bottles was easier to pour. A few complained that milk in paper cartons had leaked in

their refrigerator causing them inconvenience. Many thought that paper cartons gave the milk a papery or a waxy taste that was objectionable. Although there was no creamline milk for sale in paper cartons, some reasoned that it was impossible to get the cream from milk in paper cartons. Others found that it was difficult to pour the complete content of milk from paper cartons. A few thought that the butterfat content of milk in paper cartons was exceptionally low and complained of the poor color of the milk.

Table 18. Relation of income to family preference for paper or glass milk containers, 405 families, Logan, Utah, 1949

Income group (dollars)	Number of families	Preference			
		Glass	Paper	No preference	No answer
0 - 1000	34	18	10	4	2
1001 - 1500	46	16	23	6	1
1501 - 2100	60	25	20	13	2
2101 - 2700	56	28	18	7	3
2701 - 3300	58	22	20	14	2
3301 - 3900	52	25	14	9	4
3901 - 4500	43	19	13	8	3
4501 - 6000	40	21	11	7	1
6001 - over	16	13	1	2	0
Total	405	187	130	70	18
Percent of total	100	47	32	17	4

In favor of the use of paper cartons the remarks were also varied. Persons who purchased their milk from the store were loudest in praise for paper cartons, because it eliminated returning bottles to the store. Many preferred milk in paper cartons because they did not like to wash milk bottles. Some maintained that paper cartons took less space in their refrigerator and were easier to handle than bulky glass bottles. Some preferred paper cartons because they especially liked the particular dairy's milk that was sold in paper cartons. Some thought paper containers were more sanitary because of the single-use and machine package and seal.

When related to income there seems to be no clear cut preference for paper cartons at any particular income group. The $1001-1500 income group showed a strong preference for paper cartons. This group also showed a strong preference for purchasing milk from stores (table 13). It seems logical that consumers purchasing milk from stores would have a stronger preference for paper cartons than consumers who have milk delivered.

The higher income groups seemed to have a definite preference for glass bottles rather than paper containers.

Store and Delivered Milk

Price differentials between store and delivered milk is a very important consideration in determining whether the milk is purchased from the store or delivered. Delivering milk is a service that adds to the cost of milk to the consumer. It prevents the economies that are to be found in volume movement and handling of milk through stores. The service of delivering milk has been so generally established that many people think of it as an inherent function of the industry.

There has generally been a one cent per quart differential between the price of delivered and store milk in Logan. From the results of the study, it appears that this differential was great enough to induce many consumers to purchase their milk from the store rather than to have it delivered. This was particularly true for families to whom the store was very convenient or where children were available that could be sent to the store to buy the milk.

In this study, families were asked to evaluate the fair price for delivering milk in cents per quart either under or over the price of milk at the store. Twenty-eight percent of the families thought that milk should be eighteen cents per quart delivered if it were eighteen

cents at the store (table 19). Thirty-four percent of the consumers thought that a fair price for the service of delivering was one cent per quart, which would make delivered milk nineteen cents per quart when store milk was eighteen. Eight percent indicated they would pay twenty cents or more per quart for delivered milk when store milk was eighteen cents per quart. In the other direction, about four percent thought that delivered milk should be cheaper than store milk. About twenty-five percent of the families questioned gave no answer or did not care to place a value on the services for delivering. Apparently a sizeable shift in source of purchase could be effected by varying the price differential between store and delivered milk.

It is evident from the data collected that people at higher income levels place a greater value on the services of delivering than do people having low incomes. A majority of the low income groups considered one or more cents per quart over store prices a fair price for delivering. The lower income groups indicate that the store and delivered price should not have a greater differential than one cent per quart. Some of the families in the lower income groups thought that the price should be the same for the two sources of milk. There also was some tendency for these groups to think that delivered milk prices should be cheaper than store prices.

Probable Consumption Changes at Reduced Prices

Planning of some type is usually involved in the purchase and consumption of milk. If the price fluctuates then the plans are adjusted accordingly. The period of the milk price war was of short duration. Only ninety-six of the 405 families surveyed changed their milk consumption during the period of the milk price war. Many consumers probably did not change their purchases because of the short time interval

Table 19. Relation of family income to the families' evaluation of a fair price differential between store and delivered milk, 405 families, Logan, Utah, 1949

Income group (dollars)	Number of families	Fair price for delivered milk when store milk is 18 cents					
		Do not know	16 cents and less	17 cents	18 cents	19 cents	20 cents and more
0 - 1000	34	10	1	1	9	11	2
1001 - 1500	46	10	3		13	17	3
1501 - 2100	60	13	4		19	20	4
2101 - 2700	56	8	2		19	23	4
2701 - 3300	58	16		3	20	15	4
3301 - 3900	52	16		3	10	19	4
3901 - 4500	43	11	1		12	13	6
4501 - 6000	40	15			9	10	6
6001 - over	16	3			3	8	2
Total	405	102	11	7	115	136	35
Percent of total	100	25	3	2	28	34	8

and other circumstances that offer resistance to quick adjustment to price changes on the part of the consumer. Families contacted were asked to commit themselves as to their actions had the price of milk continued at the decreased prices.

Forty-two percent of the 405 families indicated they would increase their consumption of milk had the price of milk continued at the reduced level. Forty-eight percent answered negatively to the question and signified that reduced prices were no inducement for them to use more milk (table 20).

Table 20. Relation of family income to increased consumption of milk had the price of milk continued at reduced price, 405 families, Logan, Utah, 1949

Income group (dollars)	Number of families	Consumption change at low price		
		Yes	No	Do not know
0 - 1000	34	9	23	2
1001 - 1500	46	22	20	4
1501 - 2100	60	34	23	3
2101 - 2700	56	25	24	7
2701 - 3300	58	25	25	8
3301 - 3900	52	21	23	8
3901 - 4500	43	18	21	4
4501 - 6000	40	14	21	5
6001 - over	16	3	12	1
Total	405	171	192	42
Percent of total	100	42	48	10

Related to income there was a tendency for the lower income families to indicate they would increase their milk consumption more than the higher income families. It is interesting to note that even in the lowest income group only slightly more than thirty percent of the families indicated increased consumption at decreased prices.

Twenty-two percent of the 171 families who indicated they would make additional purchases of milk at decreased prices indicated that the additional milk would be used exclusively for drinking purposes.

Seventeen percent said the increased milk would be used for cooking and forty-seven percent said it would be used for both drinking and cooking (table 21).

Table 21. Relation of family income to 171 families who would increase milk consumption at reduced prices Logan, Utah, 1949

Income group (dollars)	Number of families	Use of additional milk			
		Drinking	Cooking	Drinking and cooking	Do not know
0 - 1000	9	2	3	3	1
1001 - 1500	22	7	3	9	3
1501 - 2100	34	6	8	16	4
2101 - 2700	25	4	3	15	3
2701 - 3300	25	4	3	13	5
3301 - 3900	21	6	3	8	4
3901 - 4500	18	3	2	11	2
4501 - 6000	14	5	4	5	0
6001 - over	3	0	0	1	2
Total	171	37	29	81	24
Percent of total	100	22	17	47	14

SUMMARY

This study of the demand for and consumption of fluid milk was confined to the city of Logan, Utah. The information was collected through personal interview of 405 families selected from a random sample. The time period covered by the study was three one week periods in October and November of 1949. Between October 7 and 19, 1949, competitive forces precipitated a milk price war in the city of Logan. Prices were drastically reduced for delivered and store purchased milk. The study was primarily concerned with consumer reaction to price changes and its effect on milk consumption during periods before, during and after the milk price war. Consumer's preferences and consumption patterns were also studied as a means of obtaining information that might be used in making a better and more efficient marketing program.

The price of milk declined from nineteen cents to thirteen cents per quart for delivered milk during the period of the milk price war. Family weekly milk consumption increased from 13.6 to 14.8 quarts during the period of the milk price war. Family expenditure for fluid milk during the period of the milk price war was $1.86 compared to $2.41 prior to the milk price war. At the termination of the milk price war the price of delivered and store milk was set at eighteen cents per quart. With the rise in price the consumption of milk decreased to about the same level that it was prior to the milk price war. This was true notwithstanding the fact that the price of delivered milk was one cent a quart cheaper after than it was before the milk price war. A one cent reduction in the price of milk seemed to have no apparent influence on consumption rates.

When milk consumption was related to income, there seemed to be a rather consistent increase in consumption with an increase in income. Families with less than a $1000 income had a weekly consumption rate of 4.7 quarts, while families with over $6000 income consumed 20.3 quarts. Only two income groups out of nine failed to show increased consumption of milk with an increase in income. After income reached about $3300 per year, the increase in consumption of milk with an increase in income seemed to be proportionately smaller than consumption increases with increased income in lower income groups. All income groups increased consumption of fluid milk during the milk price war except the highest income group. However, there does not seem to be any consistent relationship between income and increased milk consumption during the period of the milk price war.

There was a consistent relationship between milk consumption and size of family. The per capita weekly milk consumption was just as high or higher for families with eight persons as it was for families with fewer persons. The lowest per capita consumption was found with families with two persons. There was a tendency for the larger families to increase their milk consumption more than the smaller families during the period of decreased milk prices. The per capita consumption for the period before the milk price war was at a rate of about 386 pounds per year. This rate is slightly higher than the national average rate of consumption of milk for 1949.

The demand for milk was found to be inelastic for all periods studied, in all income groups, and for both delivered and store purchased milk. This condition would indicate that a one percent change in price would bring about a less than one percent change in quantity demanded. There was a definite tendency for people to vary purchases

of milk sold through stores with price changes. Demand for store milk was found to be more than ten times as responsive to price changes as was delivered milk.

In studying sources of purchasing milk it was found that about fifty percent of the milk sold in Logan was delivered milk. Thirty-nine percent of the milk was purchased from stores and eleven percent came from sources other than delivered or store sources. The amount of milk coming from other sources was especially high and can be attributed largely to the high "family cow" population in Logan. Price differentials between store and delivered milk seem to be influential in determining where the milk is purchased. Most consumers recognized that deliverying milk was a service that added to the cost of milk. Only five percent of the families objected to paying a price equal to, or higher than, the price of milk at the store for delivered milk.

There was a preference for milk in glass bottles rather than in paper or single-use containers. Paper cartons were preferred by families who purchased their milk from a store. Families in the highest income groups indicated a strong preference for milk in glass bottles instead of paper cartons.

Forty-nine percent of the families contacted indicated that they preferred homogenized milk rather than creamline milk. Thirty-eight percent preferred creamline milk while thirteen percent had no preference or did not answer the question.

About half of the families contacted thought that the price of milk was too high in relation to other foods. This feeling was true for practically all income groups. Almost forty percent thought that the price of milk was in line with the price of other foods. The price of milk has some elements of administrative control which has caused

the dairy industry to gain the reputation of profiteering and monopoly practices. It would seem desirable for the industry as well as for the consumers to have policies and educational programs that are designed to bring about good will and mutual understanding. Price justification should be one of the fundamental policies of the industry.

Ninety-six of the 405 families surveyed changed their milk consumption during the milk price war. Forty-eight percent of the families indicated that they would not change rates of milk consumption due to price changes regardless of time interval involved. Forty-two percent of the families signified that the price of milk was a consideration in purchasing milk and they did, or would have made milk consumption adjustments had the price of milk remained at reduced levels.

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Appendix

Department of Agricultural Economics
Agricultural Experiment Station
Logan, Utah

Block No. _____ Date _____

Record No. _____ Enumerator _____

Were you aware of any change in the price of fluid milk during the month of October? _____

PURCHASES OF FLUID MILK PER WEEK BEFORE OCTOBER 5, 1949 (BEFORE PRICE WAR)

Place	Unit	Quantity	Price per unit	Reason for preferring Store delivery	Reason for preferring Home delivery
Store					
Delivered					
Other					

If milk is 18 cents per quart at the store, what do you consider a fair price delivered to your home? _____

BETWEEN OCTOBER 12TH AND 19TH (DURING PRICE WAR)

Place	Unit	Quantity	Price per unit
Store			
Delivered			
Other			

PRESENT TIME

Place	Unit	Quantity	Price per unit
Store			
Delivered			
Other			

Would you have made any additional change in the amount of milk purchased had the decrease in price continued? _____

If so, what quantity change would you make? _____

_____

_____

If purchases of milk were increased, what use was made of the additional milk. Dramk more _____ Used for cooking _____

Did the additional milk used replace canned milk? _____

Do you prefer your milk in paper or glass containers? _____

Do you prefer homogenized milk? _____

In relation to other foods, is the price of milk too high, too low or about right? _____

CHILDREN UNDER 20 YEARS OF AGE

Boy	Girl	Age

Number of people 20 years of age and over in household? _____

Number of people in this household working? _____

Occupation	Salary		
	Week	Month	Year

Additional sources of income - amount? _____

_____