Cooperative Milk Marketing in Louisville

by Wm. C. Welden
and T. G. Stitts

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Cooperative Milk Marketing *in* Louisville *and other nearby cities*

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Summary

IN THE States of Ohio, Indiana, Kentucky, and Tennessee, there were 46 milk cooperatives active at the close of the year 1937. These 46 associations and 2 others with headquarters outside the 4 States but having producer-members and outlets in the area, served all but 1 of the 20 metropolitan population centers, as well as many smaller markets. Some of the organizations operated exclusively in one of the smaller markets, but several were made up of minority groups in larger markets already served by a milk association.

These 48 associations had in 1936 about 33,000 members and sold slightly less than 1,550,000,000 pounds of milk. Approximately 55 percent of the fluid milk and fluid cream consumed in the 4 States in 1936, exclusive of that retailed by producers, was marketed cooperatively.

Types of milk associations in the area range from the small strictly bargaining organization with no fixed assets and a limited marketing program to the large association distributing milk at retail and operating with more than a million dollars in plants and equipment. Altogether, there were 30 strictly bargaining associations, 4 bargaining associations which take title to the milk and handle the payments to producers, 5 bargaining associations with surplus-manufacturing plants, and 7 milk-distributing associations operating in these States at the end of 1937. In addition, 6 cooperatives engaged primarily in butter production were distributing milk in about 20 smaller cities in the area.

Either a State or a Federal control program or both has been or is now in effect in the principal markets of 42 of the 46 associations in these States. Many of the newer organizations have never operated without control and are still in the process of working out their marketing programs. Among the older associations, there have been many changes in operating methods in recent years, with a rather general expansion of service activities, and a few changes in basic organizational structure.

In the Louisville market, the Falls Cities Cooperative Milk Producers' Association, which was selected for detailed study, has had to face many of the problems common to milk associations, especially

bargaining cooperatives. In this market of more than 400,000 population, with annual graded-milk receipts of about 100 million pounds from 1,350 producers, the Falls Cities association represents about 80 percent of the milk volume. Its program has been comprehensive, and, according to analyses made in the course of this study, successful to a marked degree. A new independent association has been active in the market since 1933.

The program followed by the Falls Cities association has been strictly that of a bargaining association. It has always been well-financed, however, and has steadily developed its service and laboratory work and its educational work among producers. Although there has been a control program in the market since 1934, there has been no decrease in the association's interest in or attention to price levels. The general promotion of milk sales for members is the most important part of its program. Second is the laboratory and service work, covering a wide variety of activities; and third is the work in membership relations.

As a sales agency, the Falls Cities association operates with exclusive or full-supply contracts with both producers and milk dealers. Members can sell only through the association but are guaranteed a market every day. They are assured of payment for the milk and receive the same prices per unit as other members. Contracting dealers agree to buy only association milk but are guaranteed adequate supplies at prices the same as those paid by other contracting dealers. With these relationships established, the rest of the association's job involves (1) advertising milk, (2) helping dealers with competitive problems, (3) trying to keep seasonal and annual supplies in line with demand, and (4) trying to maintain the highest price levels for milk which can be justified by market conditions.

Seasonal variations in receipts have always been a problem with the Falls Cities association. In 3 of its 7 years of experience there has been an extreme shortage of milk in the fall, and in 4 of the 7 years a heavy surplus in the summer. A base-and-surplus plan to encourage more uniform shipments was used from February 1932 through July 1934, and to some extent accomplished this purpose. Producer discontent forced its abandonment in 1934. Other conditions, including a new health ordinance in 1932 and a marked increase in the average production per dairy, helped to decrease seasonal variations. However, a number of periods of extreme shortage can be traced to adverse weather conditions.

The volume of surplus over fluid milk and cream sales, adjusted for normal seasonal variations, declined sharply from the early part of 1932 through 1934, but except for the drought period in 1936 increased steadily from 1935 until the early fall of 1937. The amount of rainfall, the price of milk in relation to the prices of feed and of

alternative farm products, and the price spread between market milk and manufacturing milk were factors which affected the volume of surplus. Weather conditions and feed supplies and prices were the most important factors. Market milk prices were higher than warranted by the supplies and prices of feed and the relative prices of other farm products in two of four periods of excessive receipts.

Association milk has been sold to dealers at class-use prices since May 1931. As compared with the average price for manufacturing milk in the area, the class I (fluid milk) price of the association averaged $1.20 per 100 pounds higher, its class II (fluid cream) price 60 cents higher, and its class III (surplus) price 5 cents higher for the period of 80 months. Class I sales have averaged 57 percent of total receipts, class II averaged 12 percent, and class III averaged 31 percent.

Since the Falls Cities association was started, the blended price paid producers for milk of all classes in Louisville increased from $1.43 in 1932 to $2.25 per 100 pounds in 1937. From January 1933 through June 1937 there were only 4 months when the price was not as high or higher than the same month the year before. It is impossible to measure exactly the association's influence on these price levels, but it is significant that the share of producers in the price paid by consumers for fluid milk in Louisville increased from 45.2 percent (f. o. b. city) in 1932 to 51.6 percent of the total in 1937.

The Falls Cities association has developed a broad program of laboratory and service work, including checking of butterfat content and milk weights, help in solving producers' quality problems, cooperative purchasing of feed and supplies, partial control of milk hauling, financial assistance for herd improvement, and other services. Four or five men are employed to do this work.

Methods of making producer contacts and disseminating information to members include distribution of a monthly paper to all members; annual meetings attended by about one-fourth of the members; local meetings which are attended by about 55 percent of the members; field visits to about 40 percent of the farms each year; and visits to the association office by about half of the members at least once a year. Each member has an opportunity to vote (1) in the nomination of his district director every 3 years, (2) in the election of all directors at the annual meeting, and (3) in the election of local officers each year who make up the advisory council of the association.

Personal interviews with 277 milk producers shipping to Louisville—about 22 percent of the total located in all parts of the milkshed—showed the following general characteristics: Size of farm, 210 acres; size of herd, 18 cows; daily production, 40 gallons; distance to market, 26 miles; years shipping milk, 14; and cost of meeting the requirements of the health ordinance, $402. More than 75 percent of the 227 Falls

Cities members in this group have been members of the association since it started.

More than 90 percent of the members interviewed felt that the Falls Cities association had improved market conditions and, on the whole, had been worthwhile to them. Greater bargaining strength, service work, and representation of producers' interests were the principal factors mentioned that had helped to improve conditions.

Although variations in local conditions imply that some of the association's methods would not have been so successful in other markets, both the management and the members of the Falls Cities Cooperative Milk Producers' Association feel that it has accomplished much. They recognize, however, that opportunities for service may be even greater in the future and that new problems may appear if the trend of prices ceases to be upward.

TABLE 44.—RATIO OF THE RETAIL MILK PRICE LEVEL IN LOUISVILLE TO THE LEVEL OF FACTORY PAY ROLLS IN THE UNITED STATES

[1932-36=100]

Month	1931	1932	1933	1934	1935	1936	1937
January	95.5	103.8	136.7	112.1	102.8	90.5	88.9
February	82.7	101.5	129.0	99.9	79.5	90.7	81.4
March	73.7	104.8	132.1	93.4	87.6	86.0	77.0
April	75.0	112.6	139.7	90.0	93.1	84.2	71.6
May	83.8	118.6	127.4	90.0	96.3	82.6	69.6
June	88.1	127.9	115.7	92.8	99.1	84.4	70.4
July	92.6	131.6	112.9	99.7	100.4	90.3	72.0
August	101.5	135.7	106.0	96.9	94.0	93.4	77.1
September	105.6	127.9	101.0	103.7	90.7	93.3	77.8
October	105.3	122.7	101.3	98.4	87.4	87.6	77.8
November	115.1	127.9	108.3	109.1	88.2	85.9	87.1
December	116.0	131.2	110.4	104.1	86.0	81.9	90.3

Source of data: Index of retail milk price (1932-36=100) (see table 36) expressed as a percentage of the index of factory pay rolls (1932-36=100). Latter index from Bureau of Labor Statistics, U. S. Department of Labor.

TABLE 45.—PERCENTAGE OF SURPLUS OVER FLUID MILK AND CREAM SALES IN LOUISVILLE, KY., 1931-37, ADJUSTED FOR SEASONAL VARIATIONS [1]

Month	Class III sales as a percentage of class I and class II sales in—						
	1931	1932	1933	1934	1935	1936	1937
January		61	58	44	35	33	60
February		56	59	33	36	35	55
March		60	58	30	41	35	46
April		57	57	38	47	30	50
May	40	58	52	37	42	36	49
June	41	62	47	38	50	32	51
July	48	54	53	42	50	32	56
August	51	51	51	39	41	40	43
September	54	43	45	37	53	51	38
October	56	60	51	30	29	65	30
November	58	63	45	27	23	50	36
December	61	56	54	30	28	47	40

[1] For all reporting dealers.

Source of data: Records of the association.

TABLE 46.—PERCENTAGE OF NORMAL RAINFALL IN LOUISVILLE, KY., 1931-37

Month	Actual rainfall as a percentage of normal in—						
	1931	1932	1933	1934	1935	1936	1937
January	24	164	116	25	84	40	479
February	81	80	85	12	38	59	47
March	65	89	139	82	166	75	17
April	99	87	150	37	77	106	105
May	52	17	161	87	222	20	103
June	82	73	18	112	130	9	108
July	47	100	108	57	114	40	25
August	85	153	64	144	108	65	125
September	128	108	168	110	62	126	70
October	89	115	69	20	74	122	169
November	94	53	26	32	82	114	46
December	107	141	99	62	59	74	96
Year	77	97	101	66	104	69	114

Source of data: U. S. Department of Agriculture, Weather Bureau, annual reports.

TABLE 47.—LEVEL OF THE AVERAGE PRICE FOR MILK RELATIVE TO PRICES FOR FEED, LOUISVILLE, KY., 1931–37

Month	Index of relative milk price (1931–37=100) [1]						
	1931	1932	1933	1934	1935	1936	1937
January	----	111	143	109	81	107	81
February	----	118	133	109	81	105	79
March	----	117	127	104	85	105	79
April	----	109	121	104	87	106	73
May	72	114	108	111	87	107	68
June	76	120	106	101	85	110	71
July	78	136	87	89	83	94	71
August	93	129	88	81	85	82	84
September	109	137	95	77	87	79	99
October	135	139	102	79	93	83	117
November	124	144	104	82	99	86	126
December	129	146	105	75	102	82	125

[1] Average price for grade B milk divided by the average feed price, thus measuring the changes in the purchasing power of milk in terms of feed. Milk price adjusted for seasonal variations.

The feed prices are composite and are composed of: 40 percent hay; 30 percent corn; 10 percent cottonseed meal; 10 percent gray shorts; 10 percent gluten feed.
Source of data: Tables 17 and 37.

TABLE 48.—LEVEL OF THE AVERAGE PRICE FOR MILK IN LOUISVILLE RELATIVE TO PRICES FOR OTHER FARM PRODUCTS, 1931–37

Month	Index of relative milk price (1931–37=100)						
	1931	1932	1933	1934	1935	1936	1937
January	----	110	114	120	92	84	73
February	----	121	115	122	88	81	72
March	----	123	114	124	89	85	73
April	----	115	116	127	89	88	70
May	89	121	113	130	88	88	67
June	94	128	118	133	85	92	67
July	93	132	106	121	80	97	62
August	101	129	107	115	77	99	64
September	105	135	109	105	72	96	65
October	110	133	108	112	80	94	73
November	102	128	104	116	81	93	72
December	104	128	111	115	82	91	73

Source of data: Average milk price divided by the index of other farm prices, thus measuring the changes in the purchasing power of milk in terms of other farm products. Milk price adjusted for seasonal variations.

TABLE 49.—SPREAD BETWEEN AVERAGE PRICE FOR MILK IN LOUISVILLE AND PRICE FOR MANUFACTURING MILK, 1931–37 [1]

Month	Spread in cents per 100 pounds						
	1931	1932	1933	1934	1935	1936	1937
January	----	45	63	101	69	59	99
February	----	62	73	91	37	44	91
March	----	61	78	74	57	58	90
April	----	49	74	79	45	55	88
May	72	60	60	78	74	76	79
June	71	66	65	76	69	76	87
July	58	84	42	55	61	54	48
August	68	74	73	59	73	66	69
September	66	83	77	67	66	79	84
October	43	74	71	64	74	83	74
November	49	73	71	69	56	85	67
December	55	58	79	71	53	93	61

[1] Both price levels adjusted for seasonal variations.

Source of data: Tables 17 and 32.

Appendix B

Statistical Notes

Correlation analyses were used to aid in the interpretation of the relationship between the volume of fluid milk sales and adjusted retail milk prices, and also to study the influence of several factors affecting the volume of surplus milk in the market. The results of these analyses are given briefly in the following notes.

1. *Monthly volume of fluid milk sales.*—Dependent variable: Fluid milk sales of Louisville dealers with continuous records, May 1931–December 1937 adjusted for seasonal variations, index numbers, 1932–36=100. (See table 45.) Independent variable: Retail milk prices in Louisville adjusted by the level of factory pay rolls, May 1931–December 1937, index numbers, 1932–36=100. (See table 46.) The coefficient of correlation between these two variables was +0.518. Assuming that these data meet the necessary requirements from the point of view of sampling method, the "reliability chart" prepared for this purpose, may be used to indicate the statistical significance of this measure of the correlation. With 2 constants in the regression equation and a total of 80 items, a coefficient of correlation of 0.285 would appear in only one case out of 100 by chance.[17] The correlation of 0.518 is well within the range of significance, therefore, from a statistical point of view.

From a more practical viewpoint, the coefficient of correlation squared is only 0.268, so that 0.732 is the coefficient of nondetermination, meaning that 73.2 percent of the total variations in fluid milk sales are unaccounted for by the straight line regression based on retail milk prices. Another somewhat similar analysis shows that the standard deviation of the original sales data (average of the squared deviations of the individual items from their mean) is but little higher than the standard deviation of the sales data estimated from the equation based on prices. In other words the standard error of estimate is only 14 percent less than the standard deviation of the original sales data.

2. *Monthly volume of surplus milk in the market.*—Dependent variable: Volume of surplus milk as a percentage of fluid milk and fluid cream sales, August 1931–December 1937. (See table 47.) Independent variables:

(*a*) Amount of rainfall in the area during the 3-month period ending with the current month, expressed as percentage of normal. (See table 48.)

[17] Davies, G. R. and Yoder, D. Business Statistics. 1937. p. 408.

(*b*) The pool price for market milk expressed in terms of the price level for feed in the area for the 3 previous months. (See table 49.)

(*c*) The pool price for market milk expressed in terms of the price level for other farm products in the area, average for the 3 previous months. (See table 50.)

(*d*) The spread between the pool price for market milk and the price level for manufacturing milk in the area, average for the 3 previous months. (See table 51.)

All of the variables were adjusted for seasonal variations where such variations were of any importance. The variables selected and the periods of lag used were determined by comparisons of graphic illustrations, and by logical reasoning. With rainfall, for example, the effect of a deficiency one month might be almost offset by a heavy rainfall the preceding or following month. With reference to pool prices, the price for a given month is not known to producers until after the middle of the following month, and in addition there may need to be some lag between the producers' first knowledge of a change in price relationships and their ability or willingness to increase or decrease milk production. The lag and the combination of 3 months data for the independent variables seem justified for these reasons.

The coefficients of simple correlation were as follows:

Between the volume of surplus and variable *a*, plus 0.391.
Between the volume of surplus and variable *b*, plus 0.392.
Between the volume of surplus and variable *c*, plus 0.318.
Between the volume of surplus and variable *d*, minus 0.065.

With 2 constants and 77 items, the first three of these are significant on the basis of the reliability chart. The fourth is not significant from this statistical point of view.

The coefficient of multiple correlation between the monthly volume of surplus milk and the four independent variables was 0.56 which is relatively low although well within the range of statistical significance, assuming an adequate sample. This multiple correlation coefficient may be interpreted to mean that variations in these four factors, on a straight line regression basis, account for almost 32 percent of the monthly variations in the volume of surplus milk, leaving about 68 percent unaccounted for, or 0.68 as the coefficient of nondetermination.

3. *Quarterly volume of surplus milk in the market.*—Dependent variable: Volume of surplus milk as a percentage of fluid milk and fluid cream sales, July 1931–December 1937, for each calendar quarter.

Independent variables: 3-month averages for period ending with first month in the calendar quarter: (*a*) Amount of rainfall as a percentage of normal; (*b*) pool price for market milk expressed in terms of the price level for feed; (*c*) pool price for market milk expressed in

terms of the price level for other farm products; (d) spread between the pool price for market milk and the price level for manufacturing milk.

As with the monthly volumes of surplus, seasonal variations were eliminated before the monthly data were combined into 3-month averages. The lags used here were obviously somewhat different from those in the previous analysis, although none the less logical.

The coefficients of simple correlation were as follows:

Between the volume of surplus and variable a plus 0.378.
Between the volume of surplus and variable b, plus 0.422.
Between the volume of surplus and variable c, plus 0.368.
Between the volume of surplus and variable d, plus 0.455.

All of these except the first are higher than in the previous analysis, but because of the small number of items, 26 in this case, none of these is highly significant statistically, based on the reliability chart. A coefficient of about 0.39 could be expected here in about 5 cases out of 100 due to chance.

The multiple correlation coefficient here, however, was highly significant, assuming satisfactory sampling, from a statistical point of view. It was found to be 0.764, or somewhat higher than in the previous analysis. This means that approximately 58 percent of the variations in the quarterly volume of surplus can be accounted for by the straight-line regression based on these four factors.

From the standpoint of logic there are reasons for believing that these four factors might account for more of the variations in the volume of surplus than these mathematical relationships suggest. In this connection it should be emphasized that there are several rather rigid limitations in the use of such statistical analyses. For example, adjustments for seasonal variations are made on a uniform basis throughout, whereas the variations due to seasonal factors are not the same in successive years. Also the period of lag was uniform throughout, whereas on a practical basis producers are probably much more sensitive to price changes at one time than at another. The relationship between the various factors may well have been curvilinear instead of in the form of a straight-line regression during particular periods.

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