PRICE PLANS IN EASTERN MARKETS AS RELATED TO NATURAL PRODUCTION OF MILK

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A milk-marketing plan is a structure formulated to facilitate collective bargaining, as to price, between producers and distributors. Most of the price plans now in operation have been put into effect since 1920. Thus, the Philadelphia plan went into effect January, 1921; the New York plan, May, 1921; the original Pittsburgh plan, May, 1922; and the Baltimore plan, January, 1924.

People drink milk in winter as well as in summer. Nature provided that cows should freshen in spring and early summer. This allowed both dams and off-spring the chance of getting into good condition during a warm season of abundant grass before compelling them to withstand the rigors of winter when food is difficult to obtain. Ordinarily, a cow produced only enough milk to nourish a calf until it was able to shift for itself. Hence, when the cow was brought into use as a producer of milk for human consumption, man had to apply his ingenuity to adjust nature's provisions to the new human desires.

The following discussion will attempt to show the uses to which milk-marketing plans have been put in adjusting natural milk production so that it will conform more nearly to market consumption of milk. Each of three principal types of plans will be discussed. This discussion will be preceded by a brief presentation of the values of certain farm products, and differences between seasonal variation in the production and consumption of milk.

Values of Farm Products. The total value of farm products in the United States in 1926 was estimated to be slightly under 17 billions of dollars. Dairy products represented approximately three billions of dollars, or about 18 per cent of the total value. The farm value of milk in fluid uses was estimated to be about two billions of dollars, or more than that of corn, of swine, of cotton, or of any other farm product (Figure 1).

Changing Natural Production to Meet Market Demand. During the pioneer days of dairying, most milk was produced during the summer months. Farmers, in large part, accepted the natural order that cows should freshen in spring and early summer. They stripped out what milk was available during the late spring, summer, and early fall and allowed their cows to go dry during the winter.

Butter and cheese factories located in regions where natural production prevailed, were closed during the winter months. Thus, six butter and cheese factories in a dairy region in Cortland

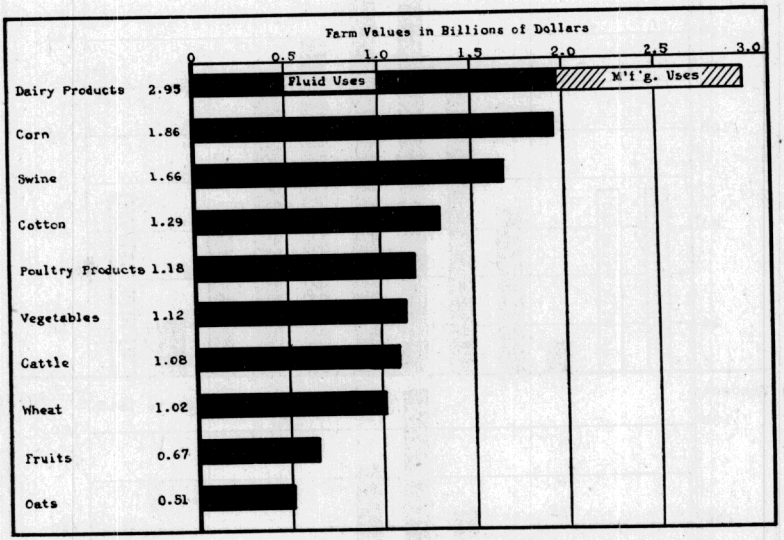

FIG. 1. Estimated values of certain farm products in United States, 1926. (From U. S. D. A. Crops and Markets, July, 1927, pp. 250 and 251.)

County, New York, on which data were procured for two years prior to 1906, received no milk during December, January, or February (Figure 2). Factories were opened the latter part of March and closed the early part of November. The volume of milk received in June, the month of heaviest production, was 86 per cent higher than the nine-month average, and eight times the volume received during November.

In order to conform to the year-round demand of milk, definite action in the way of selection and feeding was necessary to increase production, and breeding had to be controlled to get winter production. Some stimulus was necessary to induce a farmer to

take the necessary action. Generally speaking, feed costs are higher in winter than in summer, and a producing cow requires better shelter and more care during the winter than a cow which is dry during this season. Payment of a higher winter price was the only way to induce farmers to produce winter milk.[1] Consequently, milk distributors paid a price higher in winter than in summer. For

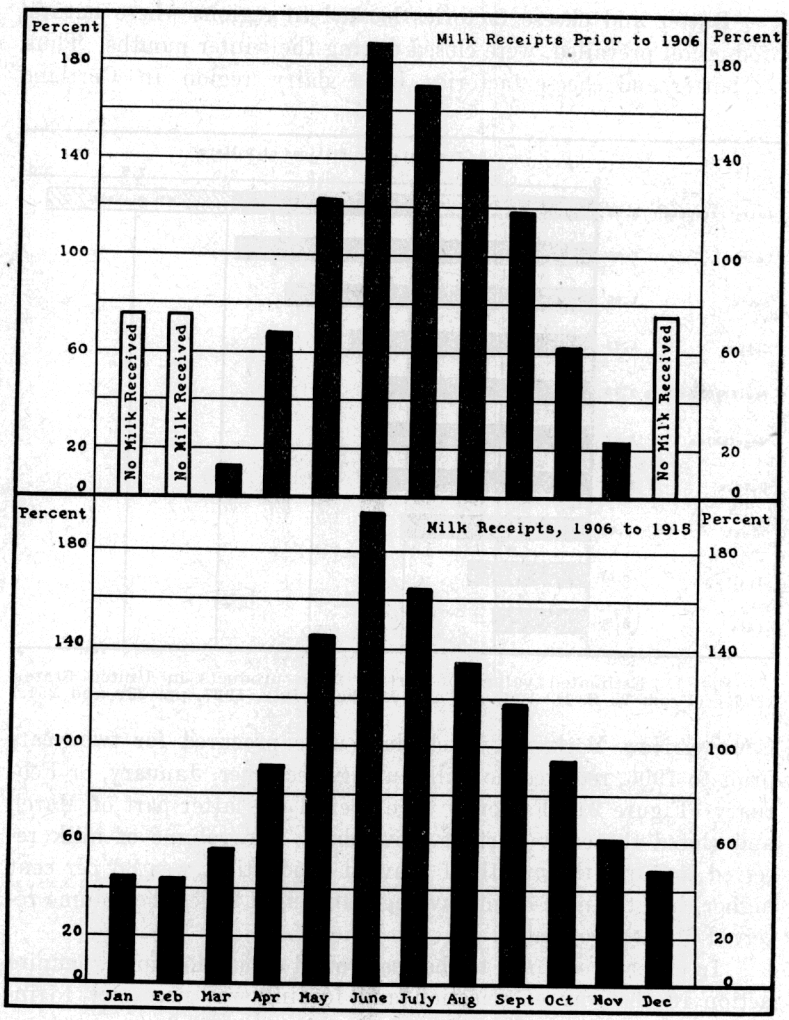

FIG. 2. Monthly variations in milk receipts at certain butter and cheese factories in Cortland County, New York.

example, the price paid for milk at ten shipping stations in Cortland County, New York, 1906 to 1915, averaged $1.77 per hundred pounds during November, December, and January, and $1.12 per hundred pounds for May, June, and July.[2] The winter price was 65 cents higher than the average price during the low months.

TABLE I—MONTHLY VARIATION OF MILK RECEIPTS AT BUTTER AND CHEESE FACTORIES IN CORTLAND COUNTY, NEW YORK, 1904 TO 1915.*

Months	Daily average of milk receipts per factory			
	Six butter and cheese factories for two years prior to 1906		Seven butter and cheese factories 1906 to 1915	
	Average volume in pounds	Per cent of nine months average volume	Average volume in pounds	Per cent of twelve months average volume
January			2,264	44
February			2,215	43
March	550	12	2,925	57
April	3,153	67	4,709	91
May	5,768	123	7,582	147
June	8,721	186	10,100	196
July	7,971	170	8,511	165
August	6,533	139	7,009	136
September	5,520	117	5,999	116
October	2,980	63	4,909	95
November	1,090	23	3,177	62
December			2,558	49
Average	4,698	100	5,163	100

* Pennsylvania State College, Agricultural Experiment Station Bulletin 208, p. 15, Table 7, December, 1926.

Stations shipping fluid milk forced butter and cheese factories within competing areas to keep open the year around in order to hold their milk supply. Thus, butter and cheese factories in Cortland County, New York, from 1906 to 1915, received milk continuously throughout the year, though their volume in June still remained over three times larger than in November (Figure 2).

[1] Recent farm management studies indicate that fall-freshening cows produce a greater volume of milk at a unit cost no higher than that for spring-freshening cows. Winter production costs for the fall-freshening cows are, however, higher than summer costs for these same animals.

[2] Penn. Agr. Exp. Sta. Bull. 208, p. 17, Table 8.

MONTHLY VARIATION IN PRODUCTION AND CONSUMPTION

Although milk production during the winter months has been greatly increased, the monthly variation in milk production still remains far wider than the variation in milk consumption. Thus, milk production in November, the month of lowest volume, in

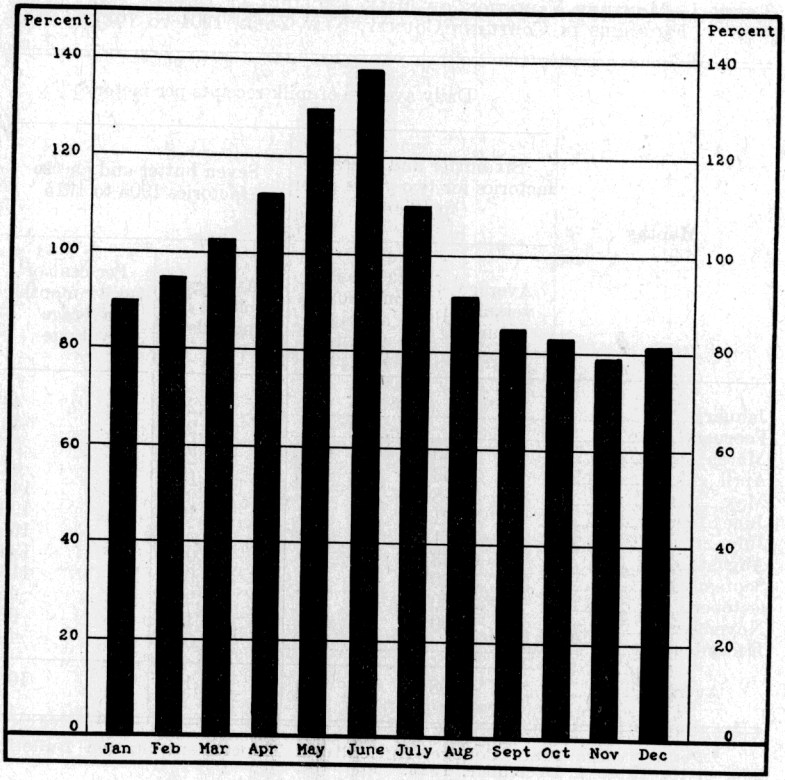

FIG. 3. Average monthly variation in production in the New York, Chicago, and Pittsburgh Milksheds.

New York, Chicago, and Pittsburgh milksheds (Figure 3) averaged 79 per cent of the year's average, and the production in June, the month of highest volume, averaged 137 per cent of the year's average, or 58 per cent higher than the November production.

Average sales of bottled and bulk milk in New York, Chicago, and Pittsburgh during August, the month of lowest demand, were 97 per cent of the year's average (Figure 4). Fluid sales in these

markets in June, the month of greatest demand, were 103 per cent of the year's average, or 6 per cent higher than those for August.

The maximum difference of 6 per cent in sales in these markets is to be compared with a maximum difference in production of 58 per cent, or over nine times the maximum variation in fluid sales.

TABLE II—MONTHLY VARIATION IN SALES OF BOTTLED AND BULK MILK, AND IN PRODUCTION, IN THE NEW YORK, CHICAGO AND PITTSBURGH MARKETING AREAS (YEAR'S AVERAGE = 100).*

Month	Sales	Production
January	98.7	90
February	99.4	95
March	100.6	103
April	100.4	113
May	100.1	130
June	102.8	137
July	99.0	111
August	96.7	92
September	100.5	85
October	102.0	83
November	100.8	79
December	98.4	82
Average	100.0	100

* Data on sales and production from the following sources:
(1) Ill. Agr. Exp. Sta. Bull. 269, p. 495, Table 18. Average monthly sales in Chicago, 1920 to 1922=100, p. 484, Table 9. Average monthly production in Chicago Milkshed, 1920 to 1922=100.
(2) U. S. D. A. Technical Bull. 73, p. 23, Table 11. Monthly averages of quarts of grade B milk in the New York market, 1919 to 1924=100.
(3) Cornell University. F. Ec. Seasonal Variation of Milk Shipping Stations, 1924.
(4) For Pittsburgh, through courtesy of the Dairymen's Cooperative Sales Company. Average monthly sales of bottled and bulk milk, 1922 to 1926=100. Average monthly production, 1922 to 1926=100.

Seasonal variation in production is a problem of the utmost significance in fluid milk markets. Otherwise expressed, this is the problem of "surplus."[3] Surplus, as used in this discussion, refers to the volume of milk (in a fluid milk market) which is not used for bottled or bulk-milk sales. The best way to handle the surplus problem is through use of a workable milk-marketing plan based upon economic principles.

[3] In a market on a flat price system, the price paid may be "weighted"—that is based upon the values of milk as utilized for the market. This, however, penalizes the distributor having a heavy surplus to the benefit of the distributor having a small surplus.

MILK MARKETING PLANS

As stated, a milk-marketing plan is a structure formulated to facilitate collective bargaining, as to price, between producers and distributors. It is usually safe to say that the plan used in any given market has been developed to solve certain problems which were most pressing in that market. Consequently, marketing plans differ widely.

There are three principal types of milk-marketing plans. One of the most common types is the "classification" or "use" price

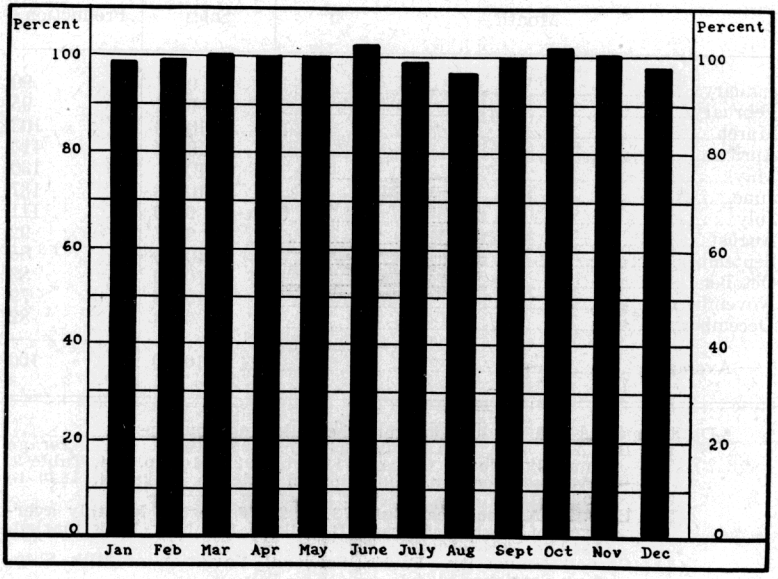

FIG. 4. Average monthly variation in bottled and bulk milk sales in New York, Chicago and Pittsburgh.

plan. This serves as a standard for selling milk by a producers' co-operative association to distributors at prices based upon its market value in different uses, as fluid milk, cream, evaporated milk, butter, or cheese. This type of plan is used in the New York and Boston markets.

Another type is the "basic-surplus" price plan. This provides for paying each producer a higher price for a uniform production of milk, and a lower price for surplus over his uniform volume. This type of plan is used in the Philadelphia market.

A third type is the "combination" price plan. This is a combination of the classification or use plan and the basic-surplus plan. Under this combined plan, milk is sold to distributors on a classified basis, and proceeds are distributed so that a producer receives higher returns for a uniform production than for a widely fluctuating volume. This type of plan is used in the Pittsburgh, Baltimore, and Connecticut markets.

The "classification" price plan may be operated in two ways, as follows:

1. An arrangement with a market pool in which an average price is paid to all organized producers in the milkshed. This "market pool" plan is used in New York.

2. An arrangement with no pooling by distributors. This "multiple pool" plan is used in Boston.

The "combination" price plan may be operated as follows:

1. Each producer states his "basic" or "specified" volume, and penalties are deducted for any volume over or under the basic volume. The so-called Connecticut (combination) price plan exemplifies this method.

2. The "basic" volume is determined by each producer's production during fixed months, and a balance maintained between money received and money distributed through use of an association's "adjustment" fund. The Baltimore price plan is an example.

3. The "basic" volume is determined so that it corresponds closely to fluid sales, a fluid price being paid for this volume, and a lower price for the surplus. The plan used in the Pittsburgh market is an example of this "equalizing value" price plan.

CLASSIFICATION PRICE PLANS

A classification price plan is a structure to sell milk to buyers in a market at a series of prices based upon the values of milk in different uses. Thus, there may be one price for milk used in fluid form; another price for milk separated to be used as cream; and other prices for milk manufactured.

The fundamental reason for paying different prices for milk in different uses is that the value of milk for fluid needs at certain seasons is not the same as the value of surplus milk for these seasons. The fluid-milk value at certain seasons is considerably greater than surplus values, while at other seasons there is less difference in their respective values.

During the period of least surplus, such as September, October, November, and December, the volume of milk in fluid uses is greater than that in surplus uses. The price of milk for fluid needs during this least surplus period might be higher than that returned for manufactured products, in order to encourage a production sufficient to supply fluid needs at this period. The result is that the average price to producers, including fluid-milk and surplus prices during this least surplus period, is governed largely by the price necessary to encourage production for fluid needs.

During the season of most surplus, such as April, May, and June, the volume of milk in surplus uses is greater than that in fluid uses. Then the average price to producers is governed largely by the value of milk in surplus uses.

THE NEW YORK CLASSIFICATION PRICE PLAN

The New York price plan has five main classifications for the different uses of milk. Milk sold to a large buyer may be divided into four or five uses. Most buyers do not have more than three uses, and in some cases a distributor has only one use for milk.

The five classifications on which milk is sold are: (1) in fluid form, (2) cream and ice cream, (3) evaporated whole milk, sweetened whole condensed, milk chocolate, whole milk powder, soft and foreign cheese, (4) butter, and (5) American cheese.

Average Price Paid to Farmers. The price which each farmer receives for milk depends upon its total market value as derived from its various uses, and the total volume. Calculations have been made for the average price paid to producers. Thus, in an example used in Figure 5, the market value of milk used in fluid sales was $3,552; in cream and ice cream, $720; evaporated whole milk, sweetened whole condensed, milk chocolate, whole milk powder, soft and foreign cheese, $485; in butter, $194; and in American cheese, $209; or a total market value of $5,160. Since the total volume sold was 200,000 pounds, the average price was $2.58 per hundred pounds. Association expense is deducted from the average price to obtain the net average price returned to producers.[4] Each producer is paid the net average price based upon his contribution of volume proportionate to the total volume of milk. Thus, the total payment to each producer was 500 times $2.58, or $1,290. (Producers B, C, and D each had the same

[4] To simplify discussion, no deductions are included in this illustration.

volume as Producer A. Hence, they also each received $1,290 for their milk.)

Summary. The New York plan may be summed up as follows:

1. The plan provides that each distributor in a market pays prices for the values of milk based upon its uses throughout the entire market.

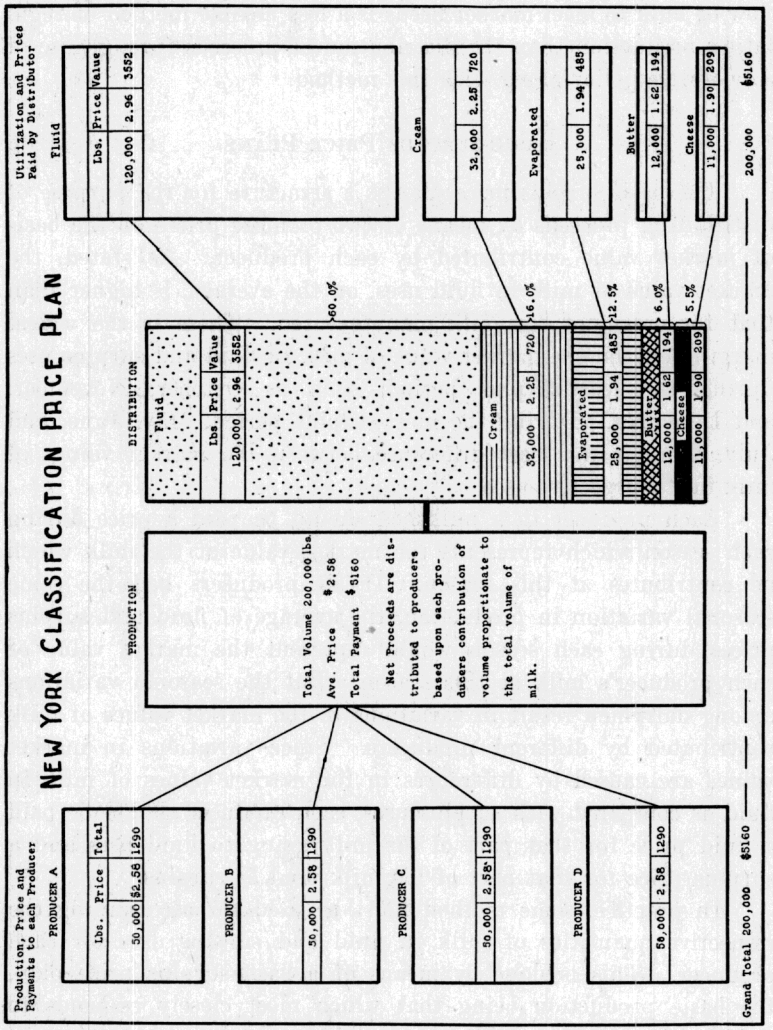

FIG. 5. Operation of New York classification price plan.

2. The plan treats all distributors in a market as a unit, instead of having as many different marketing units as there are distributors.

3. Payment of an average price to all dairymen penalizes producers having a relatively even production, to the benefit of those having a fluctuating production.

4. Raising and lowering an average price to regulate the flow of milk to meet market needs is a less flexible method of regulating production than the distribution of proceeds through use of a two-price policy along with this method.

BASIC-SURPLUS PRICE PLANS

The basic-surplus price plan is a structure for the purpose of distributing proceeds by means of two or more prices on the basis of market value contributed by each producer. As stated, the market value of milk in fluid uses, on the average, is higher than that for cream or for milk manufactured. There is the widest margin between the market value of milk in fluid and surplus uses during the least-surplus period, such as October, November, and December. During the most-surplus period, May, June, and July, there is the least difference between the market values of milk in its respective uses.

Each producer in a milkshed should be paid a price during each season which represents the market value of the milk which he contributes at this season. If all producers had the same seasonal variation in production, the average of fluid and surplus prices during each season would represent the market value of each producer's milk at this season. But the seasonal variations among dairymen result in variations in the market values of milk contributed by different producers. Since variations in market values are caused by differences in the market values of milk in fluid as compared with surplus uses, each producer should be paid a fluid price for that part of his milk going to fluid uses and a surplus price for that part of his milk used as surplus.

In practice, some method must be used for ascertaining the respective quantities of milk in fluid and surplus uses for each producer. This is done by means of a basic-surplus price plan, the basic production being that which most closely responds to fluid needs, and the surplus production being the surplus over fluid needs. A higher price can be paid for the higher value pro-

duction of each producer, known as "basic" volume, and an average surplus price, corresponding to the market value of the surplus, can be paid for each producer's surplus production.

THE PHILADELPHIA BASIC-SURPLUS PRICE PLAN

Under the Philadelphia basic-surplus price plan each producer receives two or more prices for milk, one price being paid for his "basic" milk, and the other prices for a surplus over this basic.

The "basic" volume for each producer in the Philadelphia milkshed is the average milk production of October, November, and December. Thus, in 1925, the directors of the Philadelphia producer's organization announced that October, November, and December of 1925 would be taken as the basic months on which to compute milk payments during 1926. Otherwise expressed, the basic milk for each farmer during the first nine months of 1926 would be equal to the amount of his average production during the last three months of 1925. All milk produced above this basic amount would be paid for as surplus.

Price Incentive for Even Production. Since the price for basic production is always higher than the prices for surplus over this volume, there is an incentive for each producer to maintain a production throughout the year more uniform than the natural seasonal production. The producer who has the least surplus gets the highest average price for his milk. Thus, suppose Producer A produced 50,000 pounds of which only 4,000 pounds were surplus (Figure 6). He would receive the highest average price for his milk, namely, an average of $2.67 per hundred pounds, as compared with $2.58, the average of all producers. Suppose Producer D produced 30,000 pounds over his basic production. Of this amount, 20,000 pounds would be Surplus I, and 10,000 pounds would be Surplus II. Since he would receive surplus prices for three-fifths of his total production, his average price would be only $2.38 per 100 pounds, as compared with $2.58, the average of all producers. Thus, each producer is paid a lower price for his share of surplus over basic milk while he is paid a higher price if he effects a more even production.

Summary. The Philadelphia plan may be summed up as follows:

1. The more uniform production resulting from paying a higher price to each producer for his "basic" volume than for his

surplus, results in a better adjustment of production to the consumption of milk.

2. The payment of a higher price for a "basic" production and a lower price for volume over this, more nearly approximates the value of each producer's market contribution than does the payment of an average price.

3. The basic-surplus price plan does not provide for selling milk so that each distributor in a market pays prices for the values of milk based upon its uses.

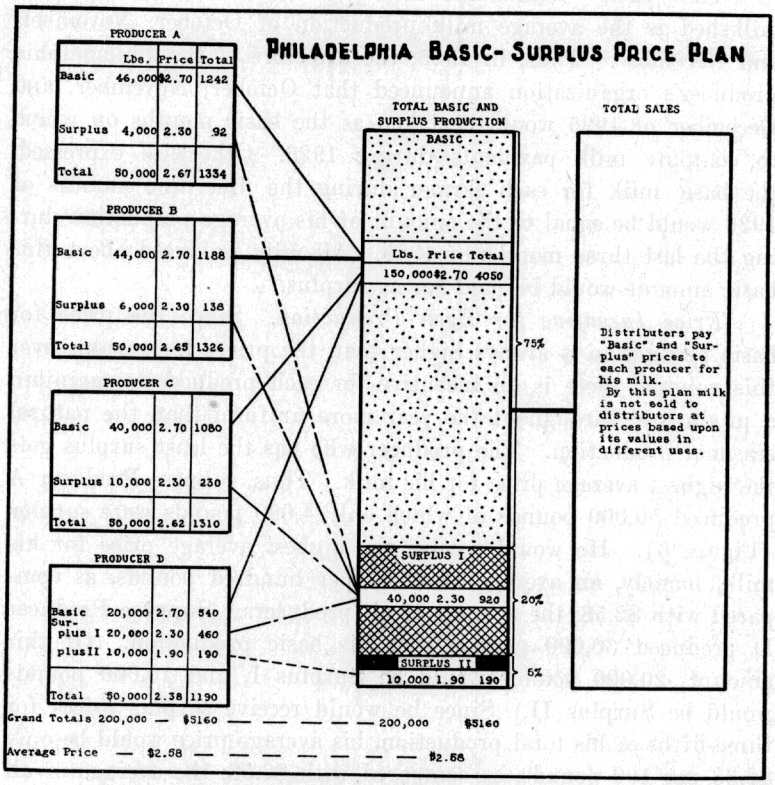

FIG. 6. Operation of Philadelphia basic surplus price plan. (Taken from Penn. State Col. Bul. 208.)

4. Lack of specific consideration of uses to which milk is put necessitates frequent modifications in the structure of the plan. Such frequent modifications tend to lessen confidence and stability within a market.

5. Lack of specific consideration of uses to which milk is put

tends to limit the operation of the plan to the fluid needs of a market, and to ignore the market uses of milk in the lower classes, such as milk used in ice cream.

EQUALIZING VALUE PRICE PLAN

Under the equalizing value (combination) price plan, milk is sold to each distributor for its market value in its different uses, and proceeds are returned to each producer on the basis of market value contributed. In developing this plan an attempt has been made to combine the sound elements of existing price plans with such new elements as seemed necessary in order to adhere to economic principles. This plan was put into operation in the Pittsburgh market October 1, 1928.

Sale of Milk to Distributors. The basis for sale of milk to distributors by the equalizing value price plan is "the sale of milk for each use at a price based upon its market value in each use." The different uses for milk are classified on a basis similar to the New York classification plan. Market prices for milk in fluid uses are arrived at in price conference of producers and distributors. Manufactured prices can be calculated on some formula, such as is used in the Baltimore or Philadelphia price plans. Where standards for grade and quality are recognized and enforced, the price for cream can be determined on a formula basis. At present, cream prices are arrived at in conference.

Illustration. Distributors in a market may pay prices and use milk in the way shown in Figure 7. Thus, of the total fluid (Class 1) sales, 50,000 pounds were used by Distributor A, 40,000 pounds were used by Distributor B, and 30,000 pounds by Distributor C. Distributor A used 10,000 pounds of the milk separated into cream; Distributor B used 24,000 pounds; and Distributor C used 30,000 pounds. Distributor A used no milk in butter; Distributor B used 6,000 pounds; and Distributor C used 10,000 pounds of the milk manufactured into butter. The market value of the milk purchased was $3,360 for fluid; $1,472 for cream; and $328 for butter, or a total of $5,160. Since the total volume was 200,000 pounds, this gave an average price of $2.58 per hundred pounds. Under the value price plan, however, proceeds are not distributed by an average pool price.

Two Prices to be Paid to Producers. Under the equalizing value price plan two prices are used to pay producers.

(1) A basic price which usually will be the fluid (Class 1) price as paid by distributors.

(2) An average surplus price which usually will be a weighted price of proceeds returned for surplus plus the proceeds returned for excess of fluid sales over farmers' basic quantity.

Thus, if the fluid price were $2.80 per hundred pounds, as shown in Figure 7, Producer A would receive this for 52,800 pounds, which was his basic volume, and Producer B would receive this for 65,280 pounds, which was his basic volume.

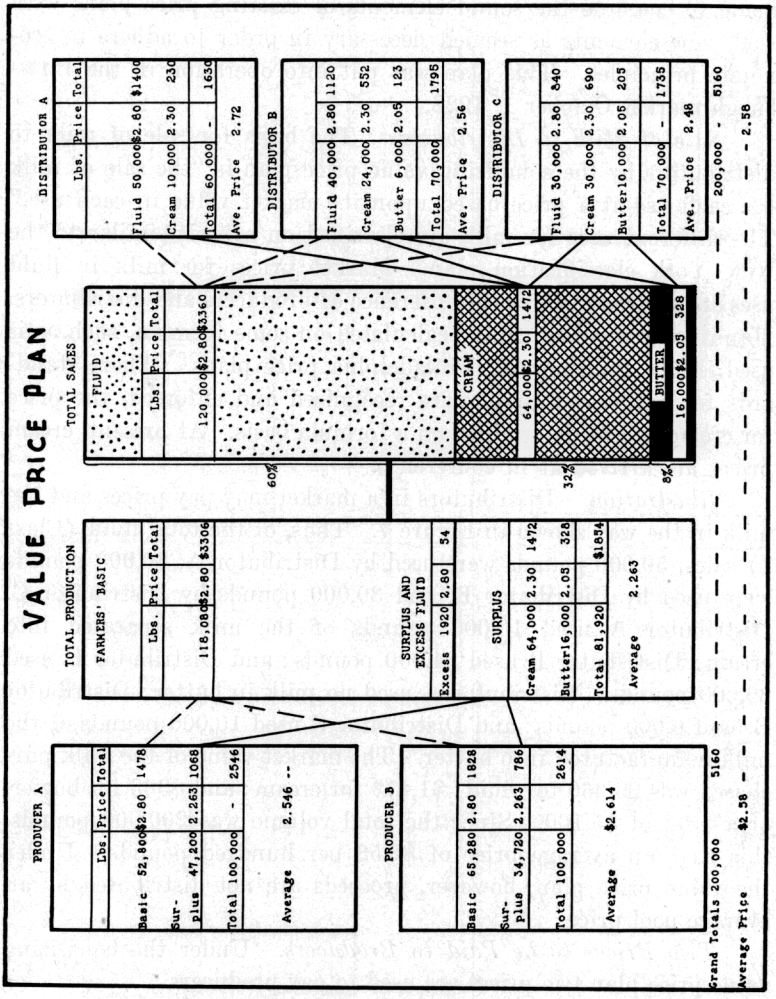

FIG. 7. Operation of the equalizing value price plan.

Summary. The equalizing value price plan may be summed up as follows:

1. Each distributor pays the market value for the milk which he receives, and each producer is paid for the market value of the milk which he contributes. This encourages the economic production and distribution of milk.

2. By its two-price basis of payment, this plan encourages a production which corresponds more closely to market sales. Use of this feature in conjunction with the flexible price feature in sale of milk to distributors, permits exercising direct control of production at all periods of the year. This is of special importance in preventing shortages or overproduction.

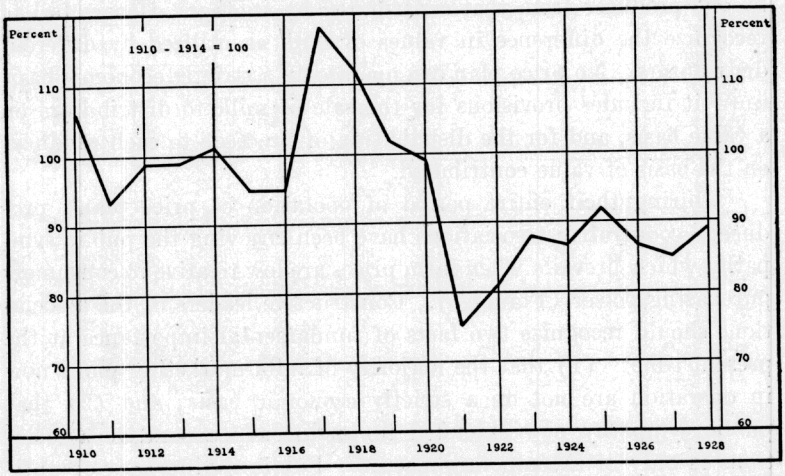

FIG. 8. Trend in purchasing power of farm products in terms of things farmers buy. [1910 to 1914 = 100]. (From Annals of the American Academy of Political and Social Science, March, 1929, p. 19. By Bureau of Agricultural Economics., U. S. D. A.)

3. By its two-price basis of payment, this plan works automatically from year to year in adjusting farmers' basic quantities to fluid sales. This obviates the necessity of frequent modifications in structure of the plan.

4. The plan is sufficiently broad in scope so that it can include those in a market using all surplus milk as well as those whose sales are largely of fluid milk.

5. The plan can be adapted to use in adjacent markets without penalizing or benefiting producer or distributor groups within these markets. This feature is of special importance in view of

probable consolidations of producers' associations in some markets which are now overlapping.

6. Use of two prices in paying each producer requires more calculations than does a one-price basis of payment.

7. Placing each producer's basic production so that it corresponds closely to his contribution to market value, makes it more necessary for him to watch changes in total market demand in its relation to total supply, if he is to realize the greatest returns for his product.

CONCLUSIONS

Some marketing plans fail to distinguish value as contributed by one producer from that contributed by another. Others fail to recognize the difference in values of milk as utilized by different distributors. No price plan can operate on a strictly economic basis until it includes provisions for the sale of milk to distributors on a value basis, and for the distribution of proceeds to each producer on the basis of value contributed.

During their entire period of operation of price plans, producers' cooperative associations have been enjoying the public sympathy which prevails when farm prices are low relative to consumers purchasing power (Figure 8). Constructive leaders of the associations should recognize two facts of fundamental importance at the present time: (1) that the majority of milk-marketing plans now in operation are not on a strictly economic basis; and (2) that public sympathy now extended to producers' cooperative associations is only of a temporary nature. Public indifference or antipathy to these associations is practically certain to follow when consumer purchasing power has its next decline. This may occur within the next year or two—possibly not for ten to fifteen years.

Social as well as economic progress of all groups interested in the dairy industry depends upon correct solution to problems of marketing milk. Much constructive work has been done through cooperative efforts of producers' associations and distributors. In some markets, consumers' groups have given their united support in improving conditions. The greatest progress at the present time lies in combining sound elements which these groups have initiated, with such additional elements as are necessary, in order to stabilize and otherwise promote the best interests of all concerned.