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FACTORS AFFECTING THE PHILADELPHIA MILK SUPPLY

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THE MILK supply of Philadelphia differs in one or more important respects from that of New York City. As explained by Dr. Ross, early regulations of the New York City Board of Health have resulted in restricting the sources of New York City's milk and cream supply to nearby territory, inspected by the Board of Health, and recent rulings of the New York State Board of Health, effective July 1, will in a similar way, limit the sources of supply for the entire state to sources which have been inspected. In contrast, prior to May 1, 1930, no Board of Health regulations had ever limited the sources of Philadelphia's fluid milk or cream supply. However, this does not mean that sanitary control measures were not operative in Philadelphia prior to that date.

SOURCES OF SUPPLY AFFECTED BY SANITARY REGULATIONS OF PRODUCERS' ORGANIZATIONS

The fluid milk supply of Philadelphia is produced chiefly by members of the Interstate Milk Producers' Association. This organization comprises over 20,000 member dairymen located in Pennsylvania, Delaware, Maryland and New Jersey. At the annual meeting of this association, December 3, 1923, rules and regulations governing the handling of milk on dairy farms in the Philadelphia milk shed and in transit, and likewise, the handling of milk and cream at creameries and receiving stations within the milk shed, were approved. These regulations formulated by the producers' organization and buyers of milk handling approximately 90 per cent of the fluid sales in the Philadelphia milk shed were made effective June 1, 1924, and the Philadelphia Interstate Dairy Council, an organization representing producers and buyers, was empowered to enforce them. Four years after the regulations were made effective, each of the 20,000 shippers had a permit signifying that the minimum requirements of the code had been met. The regulations compare favorably with those enforced by boards of health in various cities of the United States.

Producers took this initial step toward quality control because they believed that improved quality would stimulate consumer de-

mand for fluid milk and that it would also protect their market from outside competition. They also thought that farmers would respond more readily to regulations promulgated through the producers' own organization.

It has been the policy of those formulating sanitary control measures in the Philadelphia area, to anticipate well in advance any rulings which would be likely to originate with the Board of Health. For example, I quote from an editorial in the *Milk Producers Review*, the official organ of the Interstate Milk Producers Association, February, 1930:¹

"As our producers have been advised in many meetings and by word of mouth, the probabilities were that the Board of Health of the City of Philadelphia, might at any time invoke the necessity that all milk for consumption in Philadelphia be produced from cows which by test were free from tuberculosis, and that the time of grace for such testing might be short. We were advised on January 31, that such a resolution had been adopted and that no milk would be lawfully distributed in Philadelphia after May 1, 1930, unless it comes from cows that had successfully passed the tuberculin test. For those who have not had their cattle tested the time for such action is relatively short and producers shipping milk to this city should take immediate action to have their cattle tested. We are advised that the regulation will be rigidly enforced."

One weakness of the quality control work in Philadelphia is that the non-cooperating dealers and the farmers from whom they buy milk have not been required to meet the standards of the co-operative organization. However, this situation may be changed after September 1, 1930. After that date, a state law requires all milk for consumption in Pennsylvania to be produced under certain standards of sanitation.

FLUID MILK SUPPLIED BY NEARBY TERRITORY

With no restrictions on the part of the Board of Health, prior to May 1, 1930, Philadelphia presumably offered a milk and cream market to all comers. As far as milk for fluid needs is concerned, the producers' organization contracts with dealers to take all supplies offered. In general, these supplies have been adequate to furnish fluid needs. However, in order to provide a reserve in the event of shortage, and likewise perhaps, in order to secure some

¹ An editorial, *Milk Producers Review*, Interstate Milk Producers Association, Inc., Philadelphia, Pa. Vol. 10, No. 10, p. 4. February, 1930.

Table 1. Receipts of Fluid Milk at Philadelphia and Metropolitan Area, by States, 1929*

State	Forty quart units	Per cent of total
Pennsylvania.....	5,142,301	69.18
Maryland.....	956,450	12.87
New Jersey.....	579,825	7.80
Delaware.....	652,876	8.78
West Virginia.....	72,869	.98
Indiana.....	17,028	.23
New York.....	6,354	.09
Ohio.....	3,104	.04
Virginia.....	1,607	.02
Wisconsin.....	720	.01
Total.....	7,433,134	100.00

* From mimeographed reports of the Market News Service, Bureau of Agricultural Economics, U. S. D. A., Pier 4, South Wharves, Philadelphia, Pa.

price advantage, several of the large distributors have established receiving stations in northwestern Pennsylvania somewhat beyond the limits of what is usually considered the Philadelphia milk shed. However, no great expansion of the fluid milk shed has resulted.

Receipts of fluid milk at Philadelphia are closely related to whole milk consumption. Surplus milk, that is, milk above fluid needs, usually reaches the market as cream or is manufactured at the country plants. In 1929, Pennsylvania producers furnished 69 per cent of the total fluid milk receipts, and Maryland, New Jersey and

Table 2. Receipts of Cream at Philadelphia and Metropolitan Area, by States, 1929*

State	Forty quart units	Per cent of total
Wisconsin.....	86,589	21.93
Indiana.....	59,026	14.95
Minnesota.....	53,810	13.63
Pennsylvania.....	48,167	12.20
Maryland.....	38,947	9.86
Ohio.....	33,847	8.57
Missouri.....	27,041	6.85
Virginia.....	16,691	4.23
Illinois.....	4,341	1.10
Kentucky.....	4,220	1.07
Miscellaneous.....	22,177	5.61
Total.....	394,856	100.00

* From mimeographed reports of the Market News Service, Bureau of Agricultural Economics, U. S. D. A., Pier 4, South Wharves, Philadelphia, Pa.

Delaware combined, over 29 per cent (table 1 and figure 1). Over 98 per cent of the fluid milk supply of Philadelphia originated within 300 miles of the city. From these four states, 56 per cent of the milk reached the city by truck and the remaining 44 per cent by rail.

BULK OF CREAM SUPPLY FROM MIDDLE WEST

With no regulations concerning cream, the Philadelphia market furnishes an outlet for cream supplies from widely scattered parts of the country. The territory extends westward more than 1,000

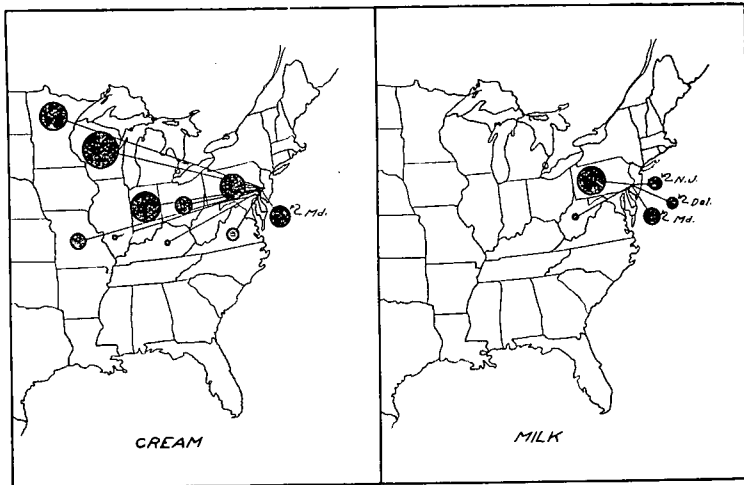


FIGURE 1. SOURCES OF THE MILK AND CREAM SUPPLY OF PHILADELPHIA AND METROPOLITAN AREA, 1929

miles across the continent, with Wisconsin the leading state—22 per cent of the 1929 supply originating within its borders (table 2 and figure 1). In contrast with the fluid milk supply, over 98 per cent of which originated in Pennsylvania, New Jersey, Maryland and Delaware, only 23 per cent of the cream supply was furnished by these four states.

MARKETING PLAN AFFECTS SEASONAL SUPPLY OF FLUID MILK

In the Philadelphia market, milk has been sold under a two-price, or basic-rating plan since 1920. A higher price throughout the year is paid for the "basic" amount than is paid for the farmer's surplus above this amount. Under this plan each producer was

originally assigned a basic quantity determined by his production during the preceding October, November and December. Recent modifications of the plan provide that the average production during these three months over the preceding three-year period shall be used as each farmer's basic quantity.

During the years 1913 to 1917, which was prior to the adoption of the basic-surplus plan, May production was 93 per cent higher

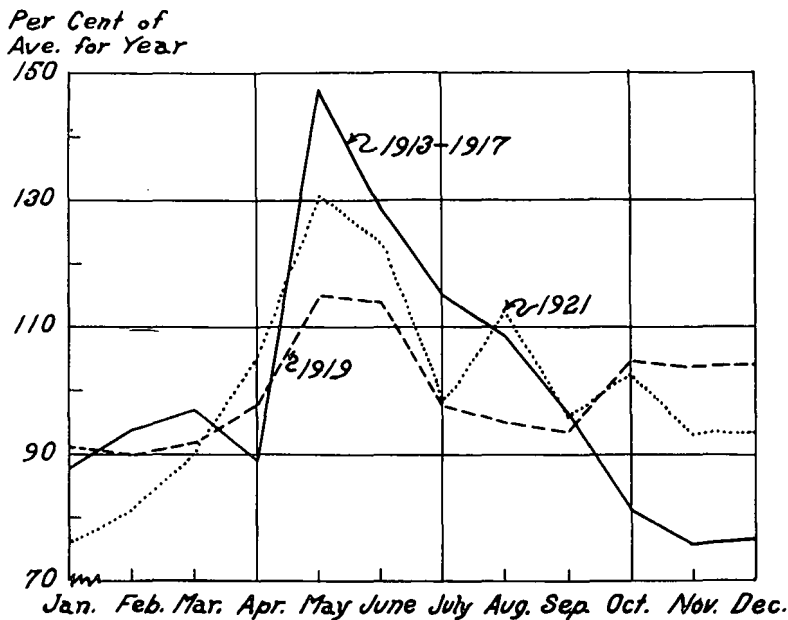


FIGURE 2. SEASONAL VARIATIONS IN THE AVERAGE DAILY PRODUCTION OF MILK IN THE PHILADELPHIA MILK SHED
(Average for the year = 100 per cent)

than—or almost double—November production (figure 2 and table 3).

In 1921, January was the month of lowest production, with May production 68 per cent higher. Four years later, in 1925, May sales were only 24 per cent greater than January sales. Summer sales for these four years continued at about the same level, the change being brought about by increased production during the fall and winter months. On the other hand, in the New York milk market, in which a basic-surplus plan was not in effect, for each can of additional milk obtained in November, 1926, over that

for November, 1922, two and one-half cans were added to the June surplus. Apparently the more even supply from month to month in the Philadelphia market was due to the basic-surplus plan of selling.

The marketing plan affects the milk supply through its influence on the price paid to farmers. The "even" producer under the basic-surplus plan receives a higher average price for milk than the "uneven" producer.

In Pennsylvania cow testing associations in 1929, there were over

Table 3. Seasonal Variation in the Average Daily Production of Milk in the Philadelphia Milk Shed*
(Average for the year = 100 per cent)

Month	1913-17	1921	1922	1923	1924	1925	1926	1927	1928	1929
January.....	88	76	86	91	94	92	102	80	98	91
February.....	94	81	86	101	93	92	100	87	99	90
March.....	97	90	86	92	91	94	98	91	98	92
April.....	89	105	89	94	91	97	98	97	98	98
May.....	147	130	131	106	113	115	109	114	111	115
June.....	129	123	127	115	111	104	113	121	117	114
July.....	115	98	113	102	97	97	99	103	99	98
August.....	109	112	114	89	97	107	97	105	97	95
September.....	97	96	103	102	100	101	101	105	97	94
October.....	81	103	93	108	107	100	99	103	98	105
November.....	76	93	86	101	104	99	93	98	95	104
December.....	77	93	85	98	103	101	92	96	94	104
Range (low to high).....	71	54	46	26	22	23	21	41	23	25

* Furnished by the Interstate Milk Producers' Association:

1913-17 computed from data presented to the Governor's Tri-State Commission;

1921-23 computed from data compiled by King;

1924-27 computed from data compiled by Interstate Milk Producers' Association.

32,000 cows with an average production of 7,751 pounds of milk per cow. Assuming sales per cow to be 7,000 pounds, total annual sales from a 25-cow herd would be 175,000 pounds. At 1929 prices for 3.5 per cent milk at receiving stations in the 51-60 mile zone, an even producer, whose June sales were but 37 per cent higher than November sales, would have received an average price of \$2.92 per hundredweight for the year for milk. An uneven producer, who sold two and one-half times as much milk in June as in November, would have received only \$2.74, or 18 cents per hundredweight less. Both producers would have received the same price during September, October and November, but during June the even producer would have received a premium of 33 cents

per hundred pounds above the price paid the uneven producer (table 4 and figure 3).

EFFECT OF TYPE OF FARMING ON MILK SUPPLY

While the basic-surplus plan has resulted in a fairly even total supply of milk for the city of Philadelphia, the seasonal adjust-

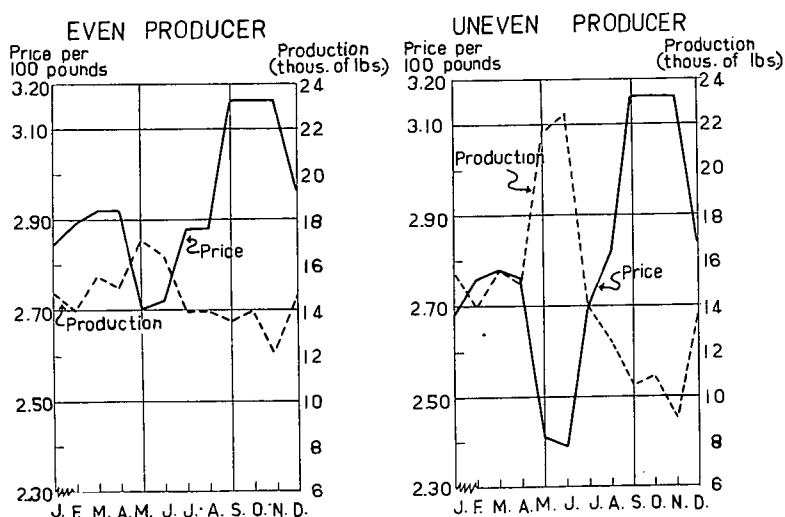


FIGURE 3. MONTHLY SALES, AND PRICES FOR 3.5 PER CENT MILK TO EVEN AND UNEVEN PRODUCERS IN THE 51-60 MILE ZONE, PHILADELPHIA MILK SHED, 1929

ments made on the various types of farms have been quite dissimilar. An analysis of production on 116 farms indicated that on dairy farms and on general farms with pasture, seasonal variation in production actually increased, while on general farms with little pasture and on crop farms, seasonal variation decreased (table 5 and figure 4).² For the four types of farms in this sample, there was a decrease of nine per cent in the seasonal variation.

² F. F. Lininger. The Relation of the Basic-Surplus Marketing Plan to Milk Production in the Philadelphia Milk Shed. Bul. 231. Pa. Agr. Exp. Sta., State College, Pa. August, 1928, p. 19.

The farms were grouped as follows:

- 17 dairy farms—farms with over 75 per cent of the income from milk.
- 56 general farms with pasture—farms with over 5 per cent of the farm acreage in permanent pasture.
- 14 general farms with little pasture—farms with less than 5 per cent of the farm acreage in permanent pasture.
- 29 crop farms—farms with less than 45 per cent of the income from dairying.

Table 4. Monthly Sales and Prices for 3.5 per cent Milk to Even and Uneven Producers in the 51-60 Mile Zone Under the Philadelphia Basic-Surplus Plan, 1929

Month	Pounds sold				Price	
	Daily		Monthly			
	Even producer	Uneven producer	Even producer	Uneven producer	Even producer	Uneven producer
January.....	476.6	503.2	14,775	15,600	\$2.84	\$2.68
February.....	500.0	500.0	14,000	14,000	2.89	2.76
March.....	500.0	500.0	15,550	15,550	2.92	2.78
April.....	501.3	500.0	15,040	15,000	2.92	2.76
May.....	550.0	700.0	17,050	21,700	2.70	2.41
June.....	552.0	750.0	16,560	22,500	2.72	2.39
July.....	450.0	450.0	13,950	13,950	2.88	2.70
August.....	450.0	400.0	13,950	12,400	2.88	2.82
September.....	450.0	350.0	13,500	10,500	3.16	3.16
October.....	450.0	351.6	13,950	10,900	3.16	3.16
November.....	400.0	300.0	12,000	9,000	3.16	3.16
December.....	475.0	450.0	14,725	13,950	2.97	2.82
Total Average...	479.5	479.5	175,050	175,050	2.92	2.74

There was a general increase in production on all types of farms, but the greatest percentage increase came on the strictly dairy farms (table 6). The dairy farmers also increased the basic amounts most. With the desire to stimulate production during these months, the best response came from those whose chief incomes were derived from milk.

It is essential to producers supplying a milk market that the total supply of the area meet the demands of the market at all times.

Table 5. Variation in Milk Production on Various Types of Farms in the Philadelphia Milk Shed, 1921-22 and 1924-25 (Expressed as a percentage of basic amounts)

Type of farming	Basic production for 1922	Range from high to low months		Difference in range
		1921-22	1924-25	
Dairy farms.....	219	20	31	+11
General farms with pasture...	190	17	28	+11
General farms with little pasture.....	118	38	24	-14
Crop farms.....	123	49	34	-31
All types.....		26	17	-9

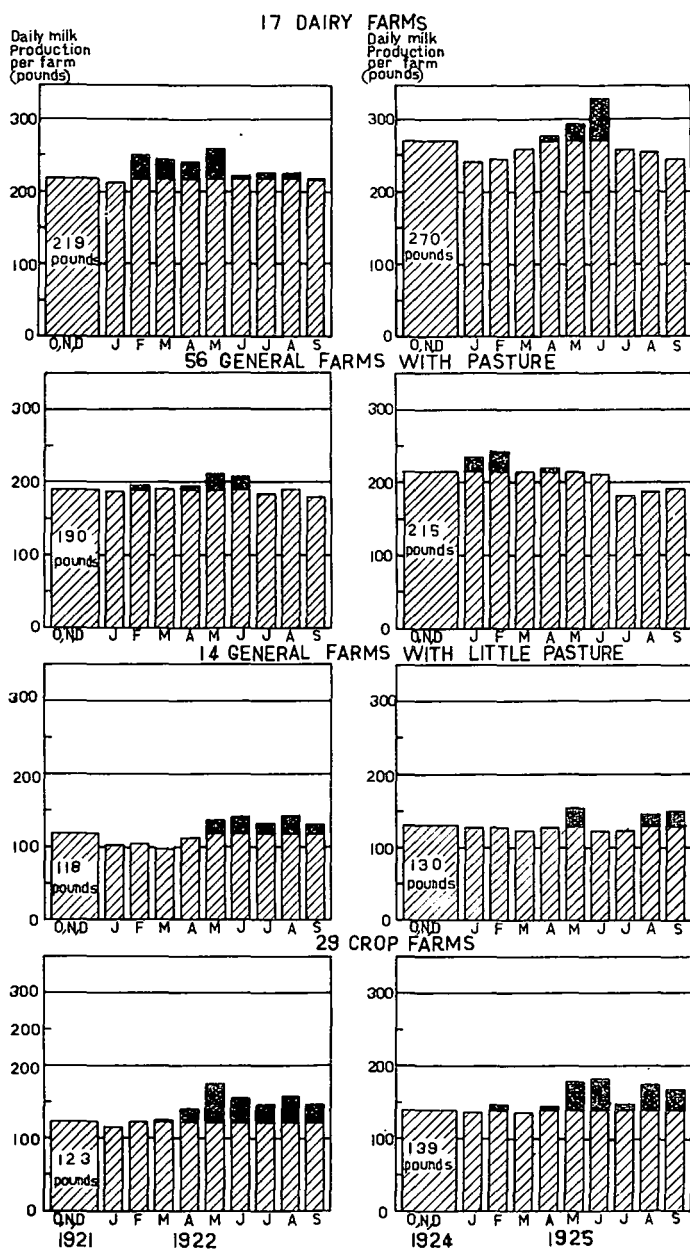


FIGURE 4. DAILY MILK PRODUCTION PER FARM FOR FOUR TYPES OF FARMING, PHILADELPHIA MILK SHED, 1921-22 AND 1924-25

The charts to the left show the relation of the average daily milk production per farm for each of the first nine months of 1922 to the average daily production per farm for the last three months of 1921. The charts to the right show the relation of average daily production during each of the first nine months of 1925 to the average daily production for the last three months of 1924.

However, it is not necessary, and often not desirable, that each individual producer furnish in accordance with the demand of consumers. For example, the dairy farmers and general farmers with pasture, who increased the range in seasonal production from 1922 to 1924, bolstered up production in October, November and December, but evidently accomplished it by fall-freshening of cows. This procedure caused them to have a low production during July, August and September. However, high production during these months by the crop farmers and farmers with little pasture, offset the low production of the other two groups, with the result that the total production for the market was very uniform.

Table 6. Changes in Production on Different Types of Farms, Philadelphia Milk Shed, 1921-22 to 1923-25

	Production during 1923-25 in per cent of 1921-22	Base for 1925 in per cent of 1922
Dairy farms.....	116	123
General farms with pasture.....	110	113
General farms with little pasture.....	109	110
Crop farms.....	111	113

EFFECT OF DISTANCE FROM MARKET ON SUPPLY

In the Philadelphia milk shed with the basic-surplus plan of selling in operation, it is more advantageous for the nearby producer to even up seasonal production than for the distant producer. Since the freight on milk is considered in determining the basic price in each freight zone, and the same surplus price prevails in all zones, a nearby producer is penalized more when he produces surplus milk. A detailed analysis of the effect of distance on the seasonal supply shows that under average conditions when a producer in the 41-50 mile zone sells 1,000 pounds of milk during the month of June, he will have to have a basic amount of 5,000 pounds to be on an equality with a producer selling a like amount of milk in the 291-300 mile zone, who has a base of only 4,000 pounds.³

Likewise, from the standpoint of producing, as well as transport-

³ Lininger, F. F. The Relation of the Basic-Surplus Marketing Plan to Milk Production in the Philadelphia Milk Shed. Bul. 231. Pa. Agr. Exp. Sta., State College, Pa. August, 1928, p. 37.

ing milk of different butter fat tests, farmers far from Philadelphia have an advantage in selling milk of high rather than low butter fat test.⁴ Some of the important Grade A shipping stations, which require a supply of milk with a high percentage of butter fat, are located several hundred miles from Philadelphia.

COST OF MAKING SEASONAL ADJUSTMENTS IN SUPPLY

A study of methods of evening production in the Philadelphia milk shed showed that 27 per cent of the producers bought cows in the fall in order to increase basic production, while 21 per cent sold cows during months following the basic period, in order to decrease the sale of surplus milk. An analysis of the normal differences in prices between basic and surplus milk indicates that this practice usually increases farmers' costs more than their returns.⁵

Fall-freshening of cows offers the best way for most producers to even up production. Fully three-fourths of the producers in the Philadelphia territory follow this method. In the years 1922-27, fall-freshened cows produced 63 per cent of the annual production during the market shortage period, October to March, while spring-freshened cows produced only 34 per cent of the annual production during this period. Fall cows produced 7 per cent more milk than spring cows, but required 6 per cent more grain to produce 100 pounds of milk. However, the larger volume of milk produced by fall cows tends to lower overhead costs per hundredweight of product.

When total production costs were considered, it was found that the cost of milk production with fall-freshened cows was \$2.59 per hundred pounds as compared with \$2.62 for spring-freshened cows (table 7). In other words, there was no significant difference in the cost of production, fall cows being as economical producers as spring cows. Neither was there any significant difference in cost between the Philadelphia and New York territories, although the

⁴ Lininger, F. F. and Weaver, F. P. How to Adjust Milk Production to the Philadelphia Milk Plan. Ext. Cir. 123. Pa. Agr. Exp. Sta., State College, Pa., March, 1929, pp. 10-11.

⁵ Lininger, F. F. The Relation of the Basic-Surplus Marketing Plan to Milk Production in the Philadelphia Milk Shed. Bul. 231. Pa. Agr. Exp. Sta., State College, Pa. August, 1928, p. 40.

former is more strictly a winter dairying section and the latter, a summer dairying region.

Considering the Philadelphia territory, fall-freshened cows of non-basic producers appeared to produce 100 pounds of milk 11 cents (\$2.59 minus \$2.48) cheaper than fall-freshened cows owned by basic producers (table 7). This difference was likely due to the fact that the basic producers push their cows too hard for most profitable feeding. They feed 10 per cent more grain to cows than non-basic producers, during the basic period. On the other hand, the basic producers did not use enough grain during

Table 7. Cost of Milk Production in Pennsylvania, 1922-27*
(Based on Cost of Production data for 9,518 Cows)

Time of freshening	Cost per 100 pounds of milk				
	Philadelphia territory in Pennsylvania		New York territory in Pennsyl- vania	Pittsburgh territory in Pennsyl- vania	All terri- tories combined
	Basic- surplus producers	Non-basic- surplus producers			
Fall (August–November)	\$2.59	\$2.48	\$2.61	\$2.63	\$2.59
Spring (February–May)	2.57	2.62	2.66	2.65	2.62
Twelve months	2.60	2.54	2.59	2.63	2.61

* These costs are based on the quantities of feed required to produce 100 pounds of milk as reported in Pa. Exp. Sta. Bul. 231, applying the following prices: Grain, \$2.50 per cwt.; silage, \$6.00 per ton; hay, \$15.00 per ton; corn stover, \$6.00 per ton. Pasture was valued at \$2.50 per month. Overhead costs were computed at \$43.30 per cow and included interest on investment in cows, buildings and equipment, breeding fees, and so forth. Labor costs were computed from unpublished data of E. L. Moffit and M. J. Armes on milk production costs for 24,191 cows in Pennsylvania Cow Testing Associations.

the pasture season, feeding 7 per cent less grain during April, May and June than non-basic producers.

When fall-freshened cows were not "over-crowded" during the fall months by too heavy grain feeding, and when they were sufficiently grain-fed during the pasture season, evidence indicates that the combined feed, labor and overhead costs per 100 pounds of milk were somewhat less—14 cents in the case of non-basic producers—than for spring freshened cows. Thus, because there are more units of milk per cow and, therefore, less overhead costs per 100 pounds of milk, and despite the fact that the feed cost per unit of milk is relatively higher, fall-freshened cows are at least as efficient milk producers as spring-freshened cows.

In the Philadelphia territory, 44 per cent of the cows owned by basic-surplus producers freshened in the fall as compared with 29 per cent for the non-basic producers, 36 per cent for Pittsburgh producers (at that time no basic-surplus plan was used in Pittsburgh) and 30 per cent for New York producers.

Thus, the basic-surplus plan of paying for milk causes farmers to increase the proportion of fall-freshened cows in their herds, and in this way may actually increase the efficiency of milk production, if fall-freshening is accompanied by proper feeding practices. However, during the past five years, in the Philadelphia territory, the disadvantage of improper feeding has more than offset the advantage of increased fall-freshening, since the total costs of producing 100 pounds of milk have been slightly higher for the basic-surplus than for the non-basic producers—\$2.60 as compared with \$2.54.

SUMMARY

The Philadelphia milk supply is unique in that the quality of the fluid milk supply is controlled entirely by the cooperative organization operating in the market. More than 98 per cent of the fluid milk supply of the city originates in four states and within 300 miles of the city. Of this amount in 1929, 56 per cent was delivered by truck and 44 per cent by rail. The bulk of the cream supply originates in the Middle West, only 23 per cent coming from the states supplying most of the fluid milk. The basic-surplus marketing plan has effected a close adjustment of seasonal production to market demand through rewarding producers who sell a large proportion of basic milk throughout the year. The response to uniform production varies among different types of farming. While many producers having large amounts of pasture land have increased seasonal variation in production, they have shown a marked ability to keep up production during the fall months. By increasing the proportion of fall-freshening cows in their herds, July and August have tended to be months of low production for these producers. Other producers, however, on different types of farms have maintained production during this period, so that the total supply for the market is closely adjusted to market demand. Distant producers are not justified in making as close seasonal adjustments as nearby producers. The costs of making these changes

in seasonal production, have, in many instances, been greater than the returns where farmers have depended on the buying and selling of cows to effect changes. However, fall-freshening of cows accompanied by proper feeding practices, offers a method of changing seasonal production so that it will be more nearly in accord with market demand, with little or no extra expense on the part of producers.