Economic Analysis of the Proposed Dairy Income Enhancement Program

by
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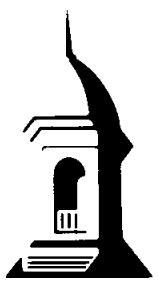
Food Marketing Policy Center
Research Report No. 10
September, 1990



The University of Connecticut
Department of Agricultural and Resource Economics

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Acknowledgements

The authors wish to acknowledge the technical assistance of Andrew Franklin and typing by Mary Udal, Food Marketing Policy Center, University of Connecticut. This paper is Scientific Contribution No. 1345, Storrs Agricultural Experiment Station, Storrs, CT. 06269.

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1. Introduction

The Dairy Enhancement Program, if enacted as proposed, will levy a handler's fee of up to two cents for each quart of milk sold in the State of Connecticut and will apportion the collected amount, net of administration and research allocations, to Connecticut dairy farmers. The amount paid per hundredweight (cwt.) of production each month will be determined by dividing the net proceeds received that month by the total milk production in the State for that month. Each farmer will receive that amount times the number of hundredweight produced.

Table 1. CONNECTICUT WAGES, INCOME, MILK PRICE, AND MILK PRODUCTION, 1977—1987.

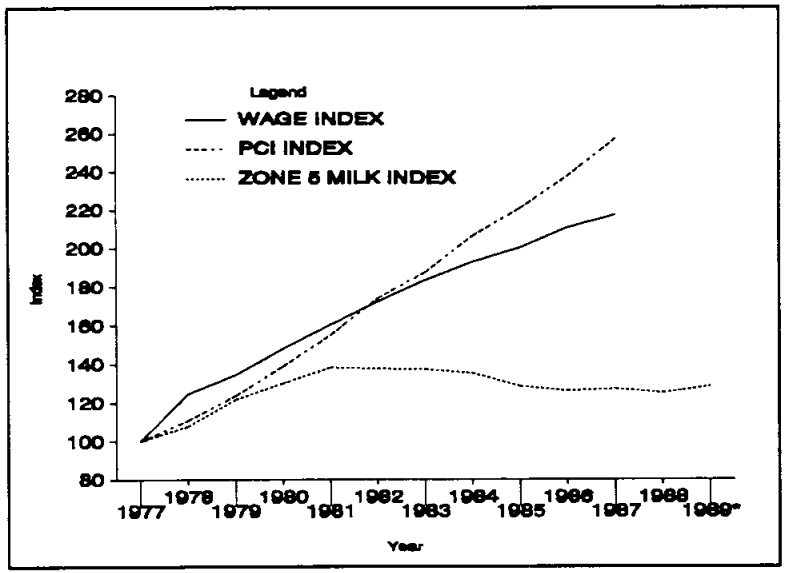
Year*	Wage $/hr	Income	Milk Price**	Milk Production***
1977	4.78	7221	10.36	624
1978	5.96	8014	11.10	612
1979	6.43	8941	12.61	606
1980	7.08	10022	13.49	617
1981	7.67	11194	14.33	643
1982	8.23	12569	14.23	644
1983	8.76	13539	14.21	654
1984	9.22	14904	14.00	611
1985	9.57	15944	13.29	620
1986	10.07	17158	13.05	600
1987	10.40	18579	13.18	567
1988	na	na	12.97	na
1989	na	na	13.29	na

* Zone 5 roughly covers Connecticut west of the Connecticut River. Most farms east of the Connecticut River receive the Zone 1 (metro Boston) price which is 10 cents per cwt. higher than the Zone 5 price.

** 1989 blend price forecast from the New England Dairy Price Forecast Committee.

*** Production in million pounds.

Figure 1. CONNECTICUT WAGES, PER CAPITA INCOME, AND ZONE 5 BLEND PRICE FOR MILK, 1977—1989; INDEXED, 1989 PROJECTED.



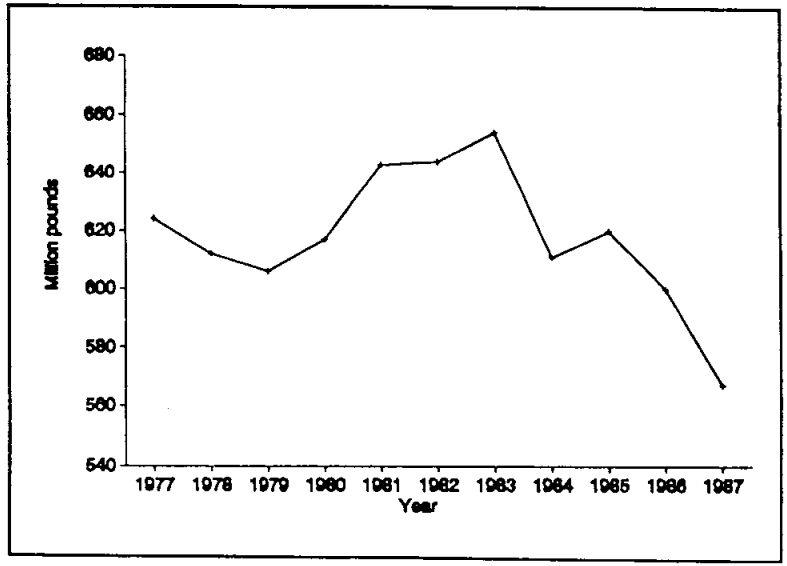
This paper presents pertinent facts and analyzes the tradeoffs and impacts of the proposed program on Connecticut consumers and farmers. The data are not readily available for an exact tally of cost and benefits; thus, in many instances one can only identify the forces at work. Table 1 and Figure 1 show why the issue of dairy income enhancement is before the legislature. As illustrated, dairy farmers have not benefited as much as others from the State's economic growth during the 1980s. Milk prices during the late 1970s rose in tandem with per capita income and the average manufacturing wage rate in Connecticut. However, since the early 1980s milk prices, as measured by the Federal Market Order blend price for zone 5, have declined while per capita income and wages have continued to climb in a strong fashion.

During the last quarter of 1987 and 1988 farmers received premiums over the blend price of as much as 30 cents per cwt. from their joint bargaining efforts with processors throughout the northeast. Also, during 1988 premiums paid by individual handlers short of milk may have added a similar amount to farmer's milk checks. These premiums are not included in Figure 1 or Table 1, which contains the underlying data. Adding

premiums of 50 to 80 cents to the 1988 blend price ($12.97/cwt.) gives an estimated farm price of $13.47 to $13.77. This is still below the price received from 1981 to 1984.

Figure 2 indicates that Connecticut milk production has declined from a high of 654 million lbs. in 1983 to 567 million lbs. in 1987, the latest year for which data are available. This 13 percent decline came primarily from a decrease in the number of dairy farms in the State. In response to the declining milk price outlook, strong off-farm employment opportunities, and the high demand for land by developers, many farmers participated in the Federal government's dairy termination program. As of January 1988 there were 390 dairy farms in the State.

Figure 2. CONNECTICUT MILK PRODUCTION, 1977—1987.



The Dairy Income Enhancement Program, as proposed, will benefit current and potential dairy farmers in Connecticut. The primary issue at hand is the impact of the program on milk prices at the farm and at the retail level in the State. In this report we analyze the potential impacts of the program on milk prices to consumers and farmers. Four sections follow. They analyze 1) short run consumer impacts, 2) long run consumer impacts, 3) short run farm impacts, and 4) long run farm impacts.

2. Short Run Consumer Impacts

This impact analysis is considered short run because it assumes all factors (other than the handler's fee) that influence milk prices are constant. The long run analysis in the next section will examine the impact of likely changes in other factors on milk prices. Currently, a processor bottling milk for fluid consumption must pay the Class I price plus premiums. In September 1988 zone 5 plants buying from Agrimark paid $13.66 plus a 75 cent/cwt. RCMA premium and a 60 cent/cwt. Agrimark premium, for a total cost of $15.01 per cwt., or $1.29 per gallon for the raw product. Assume that the fee levied from handlers is two cents per quart (eight cents per gallon, four cents per quart). How will this fee affect the milk prices that Connecticut consumers pay? To answer this question, milk price data were collected from 57 stores in 13 cities throughout the State on February 1st and 2nd, 1989. Table 2 reports average minimum and maximum prices for gallons and half gallons of whole milk, 1% lowfat, and 2% lowfat milk. The price of whole milk in the State, for example, averaged $2.30 per gallon with the lowest price surveyed being $2.01 per gallon and the highest price being $2.65 per gallon, for a price range of 64 cents. One percent milk averaged $2.11/gal. and two percent averaged $2.20/gal. Taking a simple average of these prices results in an estimated price per gallon of $2.20. The average price of half gallons was $1.25. If the full amount of the handler's fee, eight cents per gallon, is passed on to consumers by processors and retailers then it constitutes a 3.6 percent increase in the average price per gallon of milk, and a 3.2 percent increase in the average price per half gallon.

The data suggest two points: first, that the fee may not be fully passed on via milk price increases and second, that the

Table 2. MILK PRICES AND PRICE RANGES IN CONNECTICUT FOOD STORES.

Gallons

Milk type	Obs.	Ave.	Min.	Max.	Range
Whole	80	$2.30	$2.01	$2.65	$0.64
1% Lowfat	68	2.11	1.79	2.58	0.79
2% Lowfat	72	2.20	1.79	2.64	0.85

Half Gallons

Milk type	Obs.	Ave.	Min.	Max.	Range
Whole	110	$1.29	$1.08	$1.48	$0.40
1% Lowfat	79	1.23	0.99	1.53	0.54
2% Lowfat	97	1.24	1.01	1.51	0.50

price will not increase uniformly for all milk. With regard to the first point note that the minimum prices observed in the sample suggest that milk is used by some stores as a loss leader. Stores following this strategy may recoup the fee on other items. With regard to the second point note that the price ranges observed are seven to ten times larger than the eight cents per gallon handler's fee. Several other factors would appear to have more of an influence on the retail price of milk.

Table 3 identifies one such factor—product differentiation. A gallon of whole milk, for example, is essentially identical regardless of the label on the container. Yet processor name brands have higher prices than private label (store) brands. In the survey thirteen stores sold gallons of private label and branded milk that were bottled in the same plant and most likely delivered to the store in the same truck. As Table 3 indicates the average premium for gallons of branded whole milk was 11 cents; for 1% lowfat it was 8 cents, and for 2% lowfat it was 13 cents. Half gallons show an even larger spread between private label and store brands. Whereas the price of branded gallons was on average 5.1 percent higher than the price of private label

gallons, branded half gallons were ten percent higher in price than private label half gallons.

Table 3. PRICES OF PRIVATE LABEL AND BRANDED MILK BOTTLED BY THE SAME PLANT IN INDIVIDUAL SUPERMARKETS.

GALLONS Type	Store	Private	Branded	Range	% Range
WHOLE	1	$2.29	$2.39	$0.10	4.4
	2	2.39	2.49	0.10	4.2
	3	2.05	2.23	0.18	8.8
	4	2.07	2.17	0.10	4.8
	5	2.25	2.35	0.10	4.4
	6	2.29	2.39	0.10	4.4
	7	2.29	2.39	0.10	4.4
AVERAGE				$0.10	5.1
1% LOW	1	$1.99	$2.05	$0.06	3.0
	2	2.35	2.45	0.10	4.3
AVERAGE				$0.08	3.7
2% LOW	1	$2.25	$2.32	$0.07	3.1
	2	2.01	2.25	0.24	11.9
	3	2.15	2.25	0.10	4.7
	4	2.29	2.39	0.10	4.4
AVERAGE				$0.13	6.0
AVERAGE OF ALL GALLONS				$0.11	5.1

(continued)

Table 3. (continued).

HALF GALLON Type	Store	Private	Branded	Range	% Range
WHOLE	1	$1.25	1.33	$0.08	6.4
	2	1.31	1.39	0.08	6.1
	3	1.23	1.29	0.06	4.9
	4	1.24	1.35	0.11	8.9
	5	1.29	1.39	0.10	7.8
	6	1.19	1.35	0.16	13.4
	7	1.17	1.39	0.22	18.8
	8	1.38	1.47	0.09	6.5
	9	1.20	1.37	0.17	14.2
	10	1.12	1.30	0.18	16.1
	11	1.19	1.37	0.18	15.1
	12	1.17	1.45	0.28	23.9
	13	1.13	1.31	0.18	15.9
	14	1.08	1.28	0.20	18.5
	15	1.37	1.14	0.04	2.9
	16	1.17	1.33	0.16	13.7
	17	1.25	1.25	0.10	8.0
AVERAGE				$0.14	11.5

(continued)

Table 3. (continued).

Type	Store	Private	Branded	Range	% Range
1% LOW	1	$1.39	$1.41	$0.02	1.4
	2	1.07	1.47	0.40	37.4
	3	1.14	1.24	0.10	8.8
	4	1.09	1.16	0.07	6.4
	5	1.23	1.30	0.07	5.7
	6	1.29	1.35	0.06	4.7
	7	1.12	1.22	0.10	8.9
	8	1.05	1.20	0.15	14.3
	9	1.25	1.35	0.10	8.0
AVERAGE				$0.12	10.1
2% LOW	1	$1.35	$1.37	$0.02	1.5
	2	1.13	1.23	0.10	8.8
	3	1.14	1.34	0.20	17.5
	4	1.18	1.23	0.05	4.2
	5	1.29	1.31	0.02	1.6
	6	1.20	1.21	0.01	0.8
	7	1.25	1.31	0.06	4.8
	8	1.20	1.30	0.10	8.3
	9	1.11	1.21	0.10	9.0
	10	1.07	1.17	0.10	9.3
	11	1.16	1.26	0.10	8.6
	12	1.21	1.31	0.10	8.3
AVERAGE				$0.08	6.7
AVERAGE OF HALF GALLONS				$0.12	10.0

Table 4 reports observed price ranges for all types of milk in a store. It compares milk prices across all brands regardless of the plant of origin. Thus, part of the range in observed prices may be due to differences in processing and delivery costs; however, a major portion of it is probably due to product differentiation. In this larger sample the in-store range for whole milk averages 15 cents, for one percent it averages 14 cents and for two percent it averages 21 cents. Thus, the average price range for gallons was 7.7 percent of the average low price. Half gallons exhibit similar absolute price ranges, but the range was 11 percent of the average low price.

Table 4. AVERAGE PRICE RANGES FOR ALL BRANDS MILK IN INDIVIDUAL STORES.

Gallons

Milk type	# Stores	Ave. Min. Price	Average Range	Percent Range
Whole	22	$2.25	$0.15	6.7%
1% Lowfat	10	2.08	0.14	6.6
2% Lowfat	14	2.11	0.21	9.8

Half Gallons

Milk type	# Stores	Ave. Min. Price	Average Range	Percent Range
Whole	37	$1.22	$0.14	11.9%
1% Lowfat	16	1.17	0.13	11.5
2% Lowfat	29	1.19	0.11	9.6

Product differentiation—the fact that some consumers prefer branded milk (usually higher income consumers)—allows processors to increase revenues by charging a premium for their brand. This fact is very important when considering how processors will pass on the handler's fee. Profit maximizing firms will increase the price of the branded (less elastic demand) item more than the price of milk sold to retailers for private label (more elastic demand due to competition for such sales from other processors). This suggests that the price of private label milk in supermarkets will increase little and that the range of prices in the supermarket will increase. To the extent that low income consumers purchase private label milk they will pay a smaller portion of the handler's fee.

Table 5 illustrates the price range for gallons of milk in Connecticut cities where three or more stores were checked. The observed range in prices may be due to different store pricing strategies and different amounts of retail services as well as product differentiation, differences in processing costs, and store delivery charges. The observed range between cities may be due to variation in the costs of doing business in different market areas and/or variation in the vigor of competition among sellers in different markets. The average price range for whole milk gallons within markets was 28 cents; Enfield had the smallest variation at two cents per gallon, while West Hartford saw the largest variation at 46 cents per gallon. Gallons of 1% lowfat had a range of 30 cents, and gallons of 2% lowfat ranged 44 cents. The largest price variation of any milk size or type within a market occurred in Stamford where a gallon of 2% lowfat could be bought at $1.79 in one store and $2.64 in another. In fact, these stores were about a block apart.

Table 5. GALLON MILK PRICE RANGES FOR CONNECTICUT MARKET AREAS IN WHICH THREE OR MORE STORES WERE CHECKED.

WHOLE MILK

Market	No. Stores	No. Obs.	Average price	Min. price	Max. price	Range
Bridgeport	3	4	$2.32	$2.29	$2.36	$0.07
Danbury	7	10	2.42	2.29	2.60	0.31
East Haven	4	8	2.21	2.05	2.39	0.34
Enfield	3	3	2.16	2.15	2.17	0.02
N.L.-Groton	4	7	2.4	2.48	2.65	0.17
Norwich	4	6	2.32	2.19	2.45	0.26
S. Hartford	7	10	2.27	2.09	2.45	0.36
Stamford	4	5	2.41	2.25	2.64	0.39
Waterbury	7	10	2.16	2.01	2.39	0.38
W. Hartford	4	7	2.39	2.17	2.63	0.46

AVERAGE PRICE RANGE= $0.28

AVERAGE PRICE RANGE AS A PERCENT OF AVG MIN PRICE= 12.6%

(continued)

Table 5. (continued).

1% LOWFAT MILK

Market	No. Stores	No. Obs.	Average price	Min. price	Max. price	Range
Bridgeport	3	3	$2.10	$1.89	$2.23	$0.34
Danbury	7	7	2.13	1.99	2.30	0.31
East Haven	4	6	2.00	1.93	2.09	0.16
Enfield	3	3	1.98	1.95	1.99	0.04
N.L.-Groton	4	4	2.26	2.23	2.27	0.04
Norwich	4	6	2.12	2.04	2.29	0.25
S. Hartford	7	9	2.07	1.79	2.22	0.43
Stamford	4	4	2.22	1.99	2.39	0.40
Waterbury	7	9	1.99	1.89	2.09	0.20
W. Hartford	7	5	2.25	2.05	2.35	0.30
Willimantic	4	5	2.31	1.79	2.58	0.79

AVERAGE PRICE RANGE= $0.30

AVERAGE RANGE AS A PERCENT OF AVG MIN PRICE= 15.1%

(continued)

Table 5. (continued).

2% LOWFAT MILK

Market	No. Stores	No. Obs.	Average price	Min. price	Max. price	Range
Bridgeport	3	3	$2.13	$1.89	$2.27	$0.38
Danbury	7	8	2.28	1.89	2.49	0.60
East Haven	4	8	2.10	1.89	2.29	0.40
Enfield	3	4	2.08	1.89	2.21	0.32
N.L.-Groton	4	5	2.43	2.35	2.52	0.17
Norwich	4	6	2.19	1.89	2.35	0.46
S. Hartford	7	11	2.20	1.99	2.32	0.33
Stamford	4	6	2.28	1.79	2.64	0.85
Waterbury	7	9	2.12	1.93	2.49	0.56
W. Hartford	7	6	2.33	2.09	2.45	0.36

AVERAGE PRICE RANGE= $0.44

AVERAGE RANGE AS A PERCENT OF AVG MIN PRICE= 22.6%

Table 6 provides similar data for half gallons in the sample markets. Whole milk ranged 24 cents, 1% ranged 27 cents, and 2% ranged 26 cents. The largest price spread for half gallons in a market occurred in Willimantic, where the price of a half gallon of 1% lowfat ranged 44 cents per half gallon.

Table 6. HALF GALLON MILK PRICE RANGES FOR CONNECTICUT MARKETS WHERE THREE OR MORE STORES WERE CHECKED.

WHOLE MILK

Market	No Stores	No Obs	Average price	Min. price	Max. price	Range
Bridgeport	3	5	$1.31	$1.23	$1.45	$0.22
Danbury	7	14	1.32	1.20	1.47	0.27
East Haven	4	9	1.27	1.13	1.37	0.24
Enfield	3	6	1.19	1.08	1.29	0.21
N.L.-Groton	4	10	1.42	1.36	1.48	0.12
Norwich	4	9	1.30	1.17	1.39	0.22
S. Hartford	7	14	1.27	1.09	1.48	0.39
Stamford	4	8	1.33	1.19	1.48	0.29
Waterbury	7	14	1.24	1.09	1.45	0.36
W. Hartford	4	9	1.28	1.15	1.39	0.24

AVERAGE PRICE RANGE= $0.24

AVERAGE RANGE AS A PERCENT OF AVERAGE MIN PRICE= 20.4%

(continued)

Table 6. (continued).

1% LOWFAT MILK

Market	No Stores	No Obs	Average price	Min. price	Max. price	Range
Bridgeport	3	3	$1.21	$1.19	$1.25	$0.06
Danbury	7	6	1.29	1.18	1.45	0.27
East Haven	4	5	1.17	1.05	1.29	0.24
N.L.-Groton	4	6	1.31	1.28	1.35	0.07
Norwich	4	9	1.29	1.07	1.49	0.42
S. Hartford	7	11	1.21	1.09	1.41	0.32
Stamford	4	6	1.24	1.09	1.44	0.35
Waterbury	7	9	1.20	1.05	1.38	0.30
W. Hartford	7	6	1.13	0.99	1.24	0.25
Willimantic	4	9	1.34	1.09	1.53	0.44

AVERAGE PRICE RANGE= $0.27

AVERAGE RANGE AS A PERCENT OF AVERAGE MIN PRICE= 24.5%

(continued)

Table 6. (continued).

2% LOWFAT MILK

Market	No Stores	No Obs	Average price	Min. price	Max. price	Range
Bridgeport	3	5	$1.28	$1.17	$1.45	$0.28
Danbury	7	13	1.27	1.19	1.45	0.26
East Haven	4	7	1.19	1.01	1.29	0.28
Enfield	3	6	1.11	1.07	1.19	0.12
N.L.-Groton	4	7	1.36	1.30	1.45	0.15
Norwich	4	8	1.33	1.13	1.51	0.38
S. Hartford	7	11	1.24	1.09	1.37	0.28
Stamford	4	8	1.26	1.18	1.44	0.26
Waterbury	7	12	1.22	1.08	1.39	0.31
W. Hartford	7	11	1.24	1.09	1.39	0.30

AVERAGE PRICE RANGE= $0.26

AVERAGE RANGE AS A PERCENT OF AVERAGE MIN PRICE= 23.2%

In conclusion, the short run impact of the proposed handler fee if passed on fully and uniformly would raise average milk prices 3.6 % for gallons and 3.2 % for half gallons. Data was not collected on quart size containers. However, milk on a per ounce basis is generally more expensive in quarts than it is in larger containers; the two cents per quart fee if passed on fully and uniformly would mean that a consumer would experience an even lower percentage increase in the price of quarts. The fee probably will not be passed on fully and uniformly. Profit maximizing processors will most likely increase the price of branded milk more than the price of private label milk. In all cases the amount of the proposed handler's fee is smaller than currently observed price differentials between private label and

national brands. Moreover, it usually is less than one quarter of the observed variation in the price of gallons or half gallons among three or more stores in the same market area. This suggests that the short run positive impact of the handler's fee on retail milk prices will be overpowered by changes in other factors. It is to these that we now turn.

3. Long Run Impacts on Consumers

The demand for fluid milk products in Connecticut, as in other parts of the nation, is relatively stable and primarily a function of population growth and demographic factors. Per capita consumption of fluid milk products has fallen slightly during the 1980s. It was about 275 lbs. per person per year in 1980 and about 256 lbs. per person 1987[1]. Moreover, the demand for milk is relatively insensitive to changes in price (inelastic). Thus, there are no major trends or shifts in factors in demand that would influence milk prices.

The situation on the supply side is very different. At the national level supply has outpaced demand for several years. Table 7 details the impact of the national supply—demand imbalance on milk prices over time. Since 1981 the retail price index for whole milk has remained nearly constant, moving only from 128.25 to 134.60. Figure 3 illustrates the relationship between the farm price, wholesale and retail prices, and the consumer price index (CPI).

Real milk prices are obtained by adjusting the retail milk price index by the consumer price index. This is displayed in the last column of Table 7. The real price of milk to consumers declined approximately 22 percent between 1979 and 1987. The other columns in Table 7 clearly identify that the source of flat nominal and declining real milk prices during the 1980s is the decline in price received by farmers.

Will this decline in farm level milk prices continue? The answer depends upon federal dairy policy which is due for a

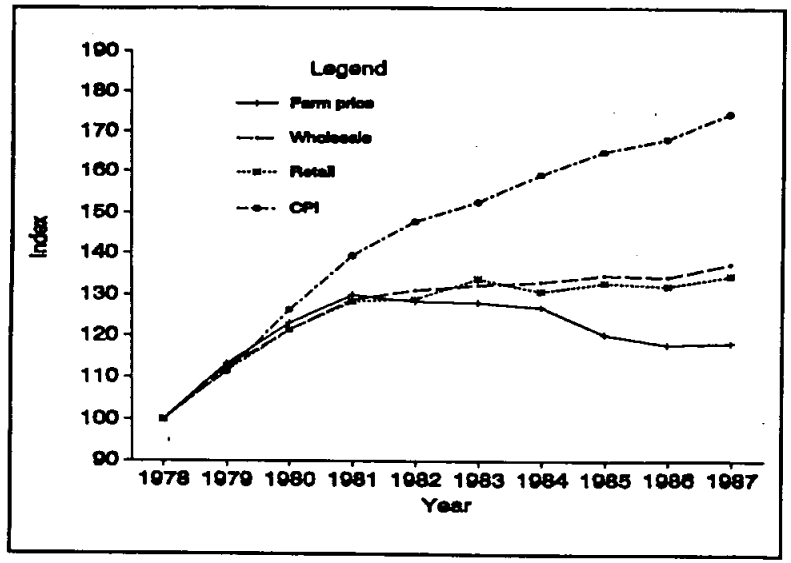
[1]Data are for the New England marketing area covering Massachusetts, Connecticut, Rhode Island, southern Vermont and New Hampshire. Pinkerton and Cotterill 1988 used Connecticut sales and population data and estimated 1987 per capita consumption at 255 pounds per year.

Table 7. U.S. MILK PRICES: FARM, WHOLESALE, AND RETAIL.

Year	Average price rc'd by farmers for all milk $/cwt	Index	Fluid milk wholesale price index	Whole milk retail price index	CPI	Real retail milk price index*
1978	$10.60	100.00	100.00	100.00	100.00	100.00
1979	12.02	113.40	112.60	111.47	111.26	100.19
1980	13.05	123.11	121.36	121.37	126.31	96.10
1981	13.77	129.91	128.91	128.25	139.41	92.00
1982	13.61	128.40	131.23	128.95	147.95	87.15
1983	13.58	128.11	132.43	133.90	152.71	87.68
1984	13.46	126.28	133.16	130.81	159.21	82.16
1985	12.75	120.28	134.62	132.85	164.89	80.57
1986	12.50	117.92	134.28	132.09	168.07	78.59
1987	12.54	118.30	137.40	134.60	174.24	77.26

* Whole milk retail price index divided by CPI

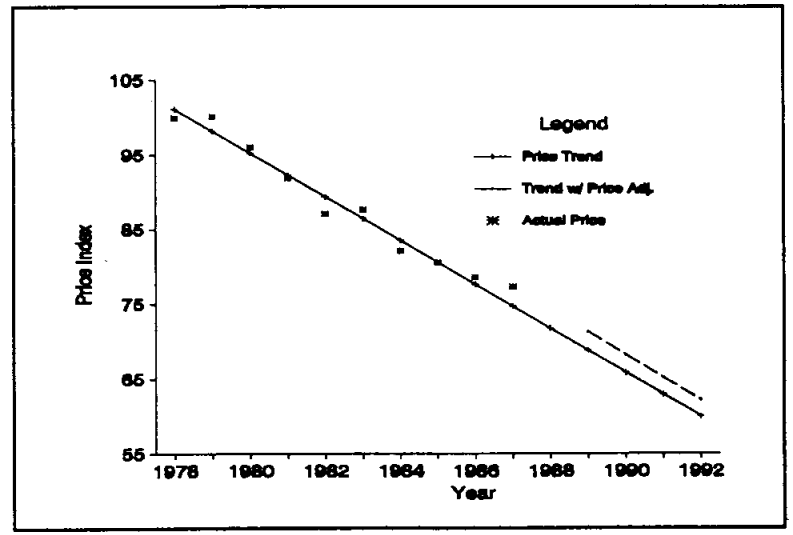
Figure 3. U.S. FARM, WHOLESALE, AND RETAIL MILK PRICE INDICES AND THE CONSUMER PRICE INDEX.



major overhaul in 1990. However, the advent of bovine growth hormone (BGH) and the accelerated improvement of the production capabilities of the milk herd by other new biotechnology methods and the more traditional artificial insemination/breeding methods virtually assure that supply will continue to outpace demand[2]. Federal policy will, if anything, be less able to retard the drop in farm level milk prices in the future.

This suggests that Connecticut dairy farmers will contin ue to face flat or declining farm level milk prices during the 1990s. Connecticut consumers will continue to enjoy declining real retail milk prices. Figure 4 integrates this long run price scenario with the impact of the proposed Dairy Income Enhancement Program upon Connecticut consumers. It assumes that the Connecticut real milk price index is identical to the U.S. real price index and

Figure 4. THE REAL MILK PRICE INDEX, ACTUAL AND PREDICTED, 1978—1992, DAIRY INCOME ENHANCEMENT PROGRAM ADJUSTMENT SHOWN.

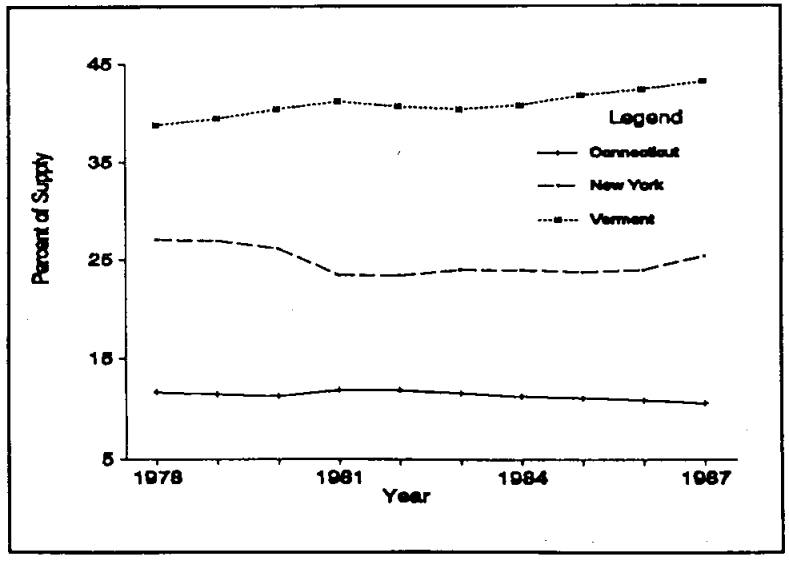


[2]A major study of the impact of BGH on the Wisconsin dairy industry reports that under field conditions and plausible assumptions about the rates of adoption, production in Wisconsin will increase between 3 and 5 percent during the 1990-1995 period. Under laboratory conditions BGH increases a cow's annual (lactation) milk production 12 to 16 percent (Marion, et al. 1988).

uses the latter to forecast future changes in the Connecticut real price index. The Dairy Income Enhancement Program fee shifts the cost of milk at most 3.6 percent. The upper line from 1989 forward registers this shift. Note that the decline in real prices continues and that the real price index regains its 1989 level by 1990, and thereafter continues downward. Therefore, with regard to supply over time, scientific progress on the farm seems to ensure that consumers will pay lower real prices for milk. Nominal retail prices probably will increase. To the extent that they do, the percent magnitude of the handler's fee (which is at most eight cents per gallon) will also decline.

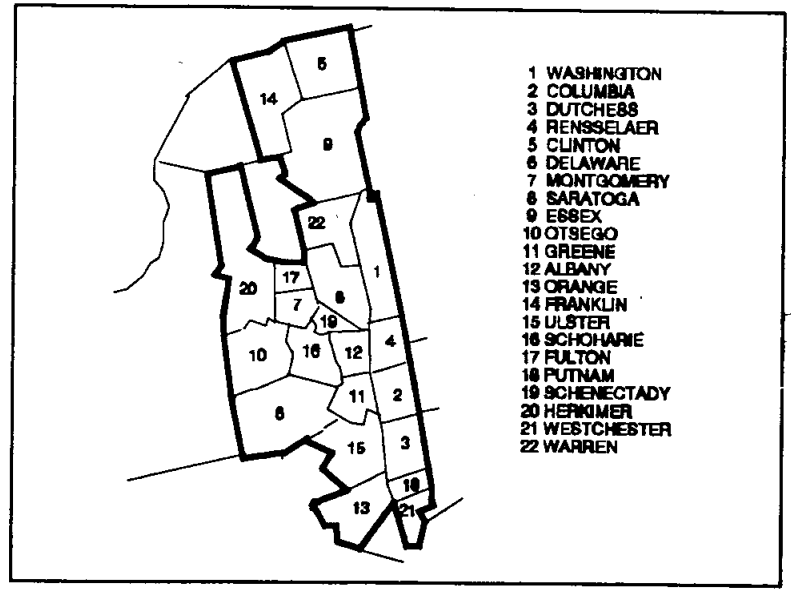
The spatial aspects of the long run supply situation are considerably more complex. It is often argued that higher transport costs for the assembly of more distant milk prices to

Figure 5. PERCENT CONTRIBUTION TO ORDER 1 (NEW ENGLAND) MILK SUPPLY FOR CONNECTICUT, NEW YORK, AND VERMONT, 1978—1987.



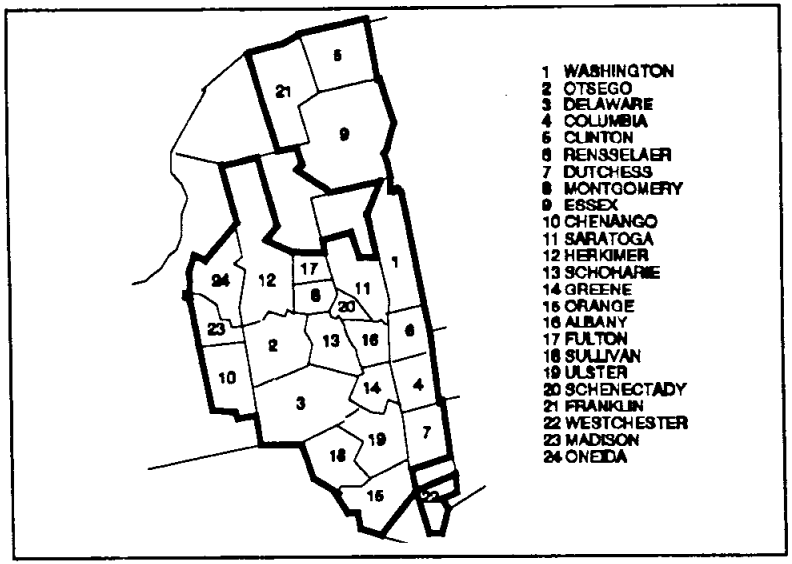
consumers[3]. Let's examine how the Southern New England (Federal Order 1) milkshed has changed during the 1980s to see if we can predict from recent behavior whether this is true and how trends in spatial shifts of production will influence Connecticut consumers. Figure 5 illustrates the trend in supplies of milk consumed in New England marketing area. It shows the percentage of Order 1 supply from New York, Vermont, and Connecticut. There is a stronger upward trend for Vermont than New York. Vermont supplied 38.8 percent of Order 1 milk in 1978 and 43.2 percent in 1987. In 1978, New York supplied 27.1 percent and in 1987, 25.4 percent. However, since 1982 there has been a steady increase in milk from New York.

Figure 6. ORDER 1 MILK FROM NEW YORK COUNTIES, MAY 1982.



[3]Bulk milk shipping costs have been estimated at $0.20 - 0.35 per hundredweight per 100 miles. See "Stabilizing of the Massachusetts Milk Market: Findings of Fact, Conclusion, and Order", Commonwealth of Massachusetts, Department of Food and Agriculture; and "Federal Milk Marketing Orders: an Analysis of Alternative Policies", USDA ERS Agricultural Economic Report 598, 1988, pp 46-48.

Figure 7. ORDER 1 MILK FROM NEW YORK COUNTIES, MAY 1988.



Milk also is being hauled greater distances into southern New England. Figures 6 and 7 identify the boundaries of the Order 1 milkshed in New York and the rank of each county in terms of supply to Order 1 for 1982 and 1988. The milkshed is clearly shifting westward.

An incontrovertible pricing law of spatial economics is that farmers located closer to a point of consumption receive higher prices than more distant farmers who supply the market. The difference is the difference in the cost of transportation that the assembler incurs to haul the milk to market. Earlier we saw that zone 5 blend prices (prices for Connecticut west of the Connecticut river) have declined or at best remained constant during the 1980s. When one combines this fact with the price law explained above it is clear that when the milkshed expanded during the 1980s, more distant New York farmers received lower prices than by farmers in zone 5, and that consumer prices did not rise due to higher costs of assembled milk. The higher transport cost was absorbed by New York farmers, not New England consumers.

Will the western and northern shift in the southern New England milkshed continue, and if it does, will it continue at no

cost to the Connecticut consumer? It seems unlikely that either would hold true for the long run. In fact, the recent premiums paid by processors (such as the 60 cents per hundredweight premium charged by Agrimark) may indicate that it costs more to assemble more distant milk. New England handlers are having to compete with other assemblers and processors for New York milk. Enhancement program payments to Connecticut farmers will increase the nearby supply beyond that elicited by the pass-through of premiums paid by processors. To the extent that this increases supply, the cost of milk to southern New England processors will decline. Thus, in the long run the supply response engendered by the Dairy Income Enhance Program will moderate its short run price impact upon consumers.

4. Short Run Impact on Connecticut Dairy Farmers

The Dairy Income Enhancement Program as proposed will increase the revenue of Connecticut dairy farmers. Table 8 illustrates how the program will work in the short run (i.e., no production adjustments by farmers in response to the program). It uses April 1987 to March 1988 milk consumption and production data. Connecticut consumers purchased approximately 820 million lbs. of Class I (fluid) milk product. Connecticut farmers produced 564 million lbs. of milk.

Table 8. SHORT RUN IMPACT ANALYSIS OF DAIRY INCOME ENHANCEMENT FEE ON CONNECTICUT FARM LEVEL MILK PRICES.

Class I milk sold in Connecticut (4/87—3/88)	819,920,018 lbs.
Dairy Income Enhancement Fund (@ $.02/qt.)	$7,627,123
Administrative Allocation (5%)	381,565
Research Allocation (2.4%)	190,678
Proceeds available for distribution to farmers	$7,055,089
Connecticut milk production (4/87—3/88)	564,000,000 lbs.
Payment per hundredweight	$1.25
Payment per quart	$0.027

If we assume that the full two cents per quart fee is assessed, then the Dairy Income Enhancement Fund will total $7,627,123. After deducting administration and research allocations, proceeds available for distribution are $7,055,089. Given the level of dairy production in the state, farmers receive $1.25/cwt. or 2.7 cents per quart.

Approximately $7.6 million dollars is collected from processors selling milk in Connecticut and the same amount is distributed within the state. The program does not shift revenue from other states to Connecticut. There is, however, a significant multiplier effect because Connecticut production is less than Connecticut consumption. For every two cents consumers pay, Connecticut farmers received 2.7 cents. This compares very favorably to other programs designed to increase farmer income that rely upon pooling of fluid (Class I) and manufacturing (Class II) milk. If, for example, Congress were to increase the Class I price in the New England marketing area by two cents a quart, farmers would receive a one cent per quart increase in the blend price because roughly one half of milk in the Order is sold for Class II use. The Dairy Income Enhancement Program is a more efficient way to transfer revenue from Connecticut consumers to Connecticut producers.

Data from the Agrifax records allow us to evaluate the impact of the proposed program on different size farms. The sample is for southern New England (Connecticut, Rhode Island, and Massachusetts) and is split into three size groups, as shown in Table 9. Focusing upon only Connecticut farms would not produce enough observations for analysis. Note that the third and fourth lines of Table 9 show the size distribution of Connecticut farms. Over half of Connecticut farms produce less than 10,000 cwt. per year, whereas one third of the Agrifax farms fit into this group. The small sample fails to represent the smaller farms in Connecticut.

Table 9 provides insight into the impact of a $1.25/cwt. revenue increase upon the financial condition of Connecticut dairy farmers. Examining the "all farms" column first, note that the sample contains 65 farms that milk on average 98 cows and produce on average 15,944 cwt. of milk per year. Net farm income—averages $43,184 per farm. Deducting depreciation gives an average net farm earning of $21,031 per farm. Adding to this off-farm income and subtracting taxes and a farm

Table 9. 1987 AGRIFAX DAIRY FARM FINANCIAL PERFORMANCE: CONNECTICUT, MASSACHUSETTS, AND RHODE ISLAND.

	Farm Size Range (cwt per year)			
	<10,000	10,000-20,000	>20,000	ALL FARMS
Number of Farms in AGRIFAX	21	30	14	65
Percent of Sample	32.3	46.2	21.5	100
No. of Connecticut Farms in Range	202	104	84	390
Percent of Total	51.8	26.7	21.5	100
Average Number of Cows	53	95	174	98
Lbs. Milk per Cow	15117	15968	17154	16272
Total Production	8012	15170	29848	15947
Milk Sales	110895	209360	411079	220996
Total Farm Cash Receipts	129126	235033	465948	250552
Labor	7921	30673	63983	30497
Interest	6323	8803	22098	10865
TT Adjusted Op. Income*	103415	190861	398670	207368
Net Farm Income	25711	44172	67278	43184
Depr. of Building & Improvement	3437	4820	8746	5219
Depr. of Machines & Equipment	9971	16670	28567	17068
Net Farm Earnings	11254	19650	38657	21031
+ Net Nonfarm Income	2588	4288	726	2972
- Family Living and Tax	18277	23257	28622	22803
= Net Earnings	- 4435	681	10761	1199
Farm Real Estate	358400	581625	920068	582402
Total Assets	549488	948926	1557061	950859
Equity	438938	721400	1115000	886000
Total Crop Acres	110.0	191.9	352.8	200.1
Return on Assets**	0.1	0.6	2.1	1.0
Return on Equity***	1.6	0.5	0.9	0.2
Dairy Income Enhancement Payment	10004	18964	37301	19930
	91	99	106	100
Payment per Crop Acre	1.7	2.5	4.5	3.1
ROA Including Payment	0.7	2.1	4.2	2.1
ROE Including Payment				

*Expenses have been adjusted for changes in payables and supply inventory.
**ROA=((Net Farm Earnings + Interest - Family Living)/Avg. Farm Assets)*100.
***ROE = ((Net Farm Earnings - Family Living)/Average Farm Equity)*100

operator/family living allowance produces net earnings per farm of only $1,199. Average equity invested is $886,000 and average total assets invested in these farms are $950,859.

Return on assets is 1.0 percent and return on equity is a negative 0.2 percent. As a group these farms are, by standard accounting measures, very stressed businesses.

The Dairy Income Enhancement Program would pay on average $19,930 to these farms annually. This amounts to $100 per crop acre. ROA would increase to 3.1 percent and ROE would increase to 2.1 percent. Is this increase in income too little,

just right, or not enough? This is, of course, the main question of this entire exercise. For the moment let's finesse the question and return to it in the long run impact section.

When one looks at the breakdown by size of farm in Table 9, an important fact emerges. Larger farms have higher production per cow than smaller ones. As a result, the financial performance of larger farms is stronger than that of smaller farms. Since the Dairy Income Enhancement Program is driven by milk production, the distribution of program benefits is skewed towards the larger more efficient farms. The program, as proposed, would probably accelerate the trend towards larger more efficient farms in Connecticut.

5. Long Run Impacts on Connecticut Dairy Farmers

In the long run the amount of milk consumption and production in the state will change and these changes will have a major impact on how the program works. Consider consumption first. Assuming a constant two cent per quart fee, the size of the Dairy Income Enhancement Fund will grow as consumption increases. Since per capita consumption of fluid milk products will remain relatively constant or possibly decrease, the major source of growth in consumption will be population growth. The state's annual population growth rate is roughly 0.4 percent. Thus, the fund will most likely not keep up with inflation over time.

The other determinant of the payment rate to farmers is the amount of production in the state. As state production increases (decreases) the payment rate decreases (increases). This fact suggests an answer to the question addressed in the previous section. The market will tell us whether $1.25 per cwt. is too high or too low. If the rate is too high, milk production in the state will expand, which will reduce the rate. If the rate is too low, farms will exit, production will decrease and the payment rate will go up, thereby making it more attractive for the remaining farms to continue dairy production.

In equilibrium the payment rate will reflect the added costs of operating a dairy farm in Connecticut. This added cost will include the opportunity cost of keeping land in dairy production. Approximately 88 percent of Connecticut's crop land is in dairy farms. To illustrate the operation of the program in the long run, consider a few examples. If more of the dairy farm

land in the state goes into the Farmland Preservation Program, the opportunity cost of land will decline, production will increase and the payment rate will decline to a lower level.

The Dairy Income Enhancement Program and the Farm land Preservation Program could provide symbiotic benefits in another way as well. The Enhancement Program by itself will tend to preserve dairy farms in lower land value areas — primarily in the northwestern and eastern parts of the state. This will be the case because dairy farmers in the high land value areas (primarily the Connecticut River valley) will find the opportunity cost of farming too high. As they exit, the payment rate will go up, benefiting the remaining farms. If the state wishes to preserve open space in the high value areas, it could do so by focusing its purchases of development rights there. Together the two programs might do a better job preserving open space in all regions of the state.

How many Connecticut farms will the proposed seven million dollar enhancement fund preserve? If we knew the equilibrium payment rate (i.e., the Connecticut cost differential due to higher wage rates, land costs, etc.), this question could be answered. For example, if the equilibrium payment rate is $1.00 per cwt, then the fund would induce production of 7 million cwt., up from the 1987 production of 5.64 million cwt. This is a 24 percent increase in production. Both farm size and the number of farms would probably increase. If the equilibrium payment rate is $3.00 per cwt, the fund could support production of 2.33 million cwt. of milk. This is only 41 percent of 1987 production statewide. This adjustment would come through a decline in the number of farms. The farms that survive would, in part, do so by expanding to larger sizes. This also would add to the decline in the number of farms.

From the perspective of economic efficiency, there probably is no more effective way for the state, on a dollar spent basis, to enhance dairy farming in Connecticut. The Dairy Income Enhancement Program makes maximum uses of market forces to allocate the fund. Farmers who are more efficient and have the lowest opportunity cost survive. Over the long run the bulk of these efficiency gains will be passed forward so that the decline in real milk prices will continue to benefit consumers.

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