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Implications of Seasonal Milk Production in New York and Season Price Incentive Plans

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**Implications of Seasonal Milk Production in New York
and Seasonal Price Incentive Plans**

by

Harry M. Kaiser

April 1989

No. 89-8A

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Preface

Harry M. Kaiser is an assistant professor in the Department of Agricultural Economics, Cornell University. The author acknowledges useful comments and suggestions from Katherine Beissner, and the assistance of Mary Jo DuBrava and Lillian Thomas in preparing this paper.

This paper was submitted as testimony for the hearings on the proposed amendments to the New York-New Jersey and New England Federal milk marketing orders. Dr. Kaiser's testimony concerns an amendment which proposes replacing the current Louisville seasonal price incentive plan with a Base-Excess program. While fundamentally different, both programs are designed to lessen milk production seasonality by providing financial incentives and disincentives for less production in the spring and more production in the fall. His testimony is based on recent research with respect to the ramifications of milk production seasonality in New York State and policies designed to mitigate this problem. The interested reader is referred to the following publications which summarize the results of this research in greater detail:

Kaiser, Harry M., Pascal A. Oltenacu, and Terry R. Smith,. "The Effects of Alternative Seasonal Price Differentials on Milk Production in New York." **Northeastern Journal of Agricultural and Resource Economics**, Vol. 17, No.1, pp. 46-55, April 1988.

Oltenacu, Pascal A., Terry R. Smith, and Harry M. Kaiser. "Factors Associated With Seasonality of Milk Production in New York State." **Journal of Dairy Science**, Forthcoming.

Putnam, James N. II, Sidney E. Barnard, Harry M. Kaiser, and Fred C. Webster. Dairy Marketing in the Northeast: Summary Version. Published by the **Springfield and Baltimore Farm Credit Banks**, October 1987.

Putnam, James N. II, Sidney E. Barnard, Harry M. Kaiser, and Fred C. Webster. Dairy Marketing in the Northeast: Comprehensive Version. Published by the **Springfield and Baltimore Farm Credit Banks**, November 1987.

Implications of Seasonal Milk Production in New York and Seasonal Price Incentive Plans*

My name is Harry M. Kaiser and I am here to testify on Proposal Number 12, which would replace the existing Louisville seasonal price incentive plan in the New York-New Jersey (Federal Order #2) and New England (Federal Order #1) Federal milk marketing orders with a Base-Excess price incentive plan. I am an assistant professor of agricultural economics at Cornell University in Ithaca, New York. I have been in this position since August 1985.

My position at Cornell is split into three categories: 50% of my time is devoted to research, and the remaining 50% is split equally between teaching and extension. The majority of my research (90%) has focused on federal dairy policy issues in New York, the Northeast, and nationwide. The focus of my 25% extension appointment closely parallels my research component, i.e., I work with dairy industry leaders in the public and private sectors on dairy policy issues. I have taught two courses: (1) Ag. Econ. 346 (Dairy Marketing and Policy) and (2) Ag. Econ. 412 (Mathematical Programming). I have authored, or coauthored, 13 journal articles and 64 manuscripts in agricultural economics, as well as given 44 presentations and speeches around the country in my career thus far. By far the majority of this output has centered on dairy policy, including the seasonality issue which I will discuss today. Hence, I think that it is accurate to state that I have devoted a significant portion of my time to studying dairy policy, both in New York (and the Northeast), and nationwide and I have accumulated some expertise on this complicated, but fascinating industry.

Prior to joining Cornell's faculty, I was a graduate student of Agricultural

* This paper is the author's written testimony to the amendment hearings for the New York-New Jersey and New England Federal milk marketing orders. This testimony was submitted into the records on November 15, 1989.

and Applied Economics at the University of Minnesota. At Minnesota I specialized in micro and macroeconomics, agricultural policy, marketing, and production economics. I received a Ph.D. from the University of Minnesota in July 1985. My other educational accreditations include an M.S. in agricultural and applied economics from the University of Minnesota, and a B.A. in economics and history from the University of Wisconsin-Eau Claire.

The issues I will address today concerns the proposed adoption of a Base-Excess plan and elimination of the Louisville plan in Federal Orders #1 and #2. The purpose is to present some results of my research on the impact of milk production seasonality on the Northeast dairy industry, and some of the economic implications of alternative seasonal price incentive plans designed to lessen this seasonality in the Northeast. My remarks will draw from two research projects that I was involved with between 1985 and 1988. The first project was entitled **Dairy Marketing in the Northeast**, a project sponsored by the Farm Credit Banks of Springfield and Baltimore, Cornell University, The Pennsylvania State University, and the University of Vermont. The principal investigators of this project were James Putnam (Farm Credit Banks of Springfield), Dr. Sidney Barnard (The Pennsylvania State University), Dr. Fred Webster (University of Vermont), and myself. One of the issues dealt with in this study was the impact of seasonality on the Northeast's competitive position relative to the national dairy industry. The second project was entitled **Determination of Financial Incentive Plans and Development of Appropriate Farm Management Strategies to Correct Seasonality of Milk Production in New York State**, sponsored by a New York Agriculture and Markets Research Grant. The principal investigators of this project were Dr. Pascal Oltenacu (Cornell University), Dr. Terry R. Smith (Cornell University), and myself. The purpose of this research project was to examined various economic dimensions of milk

production seasonality in New York State.

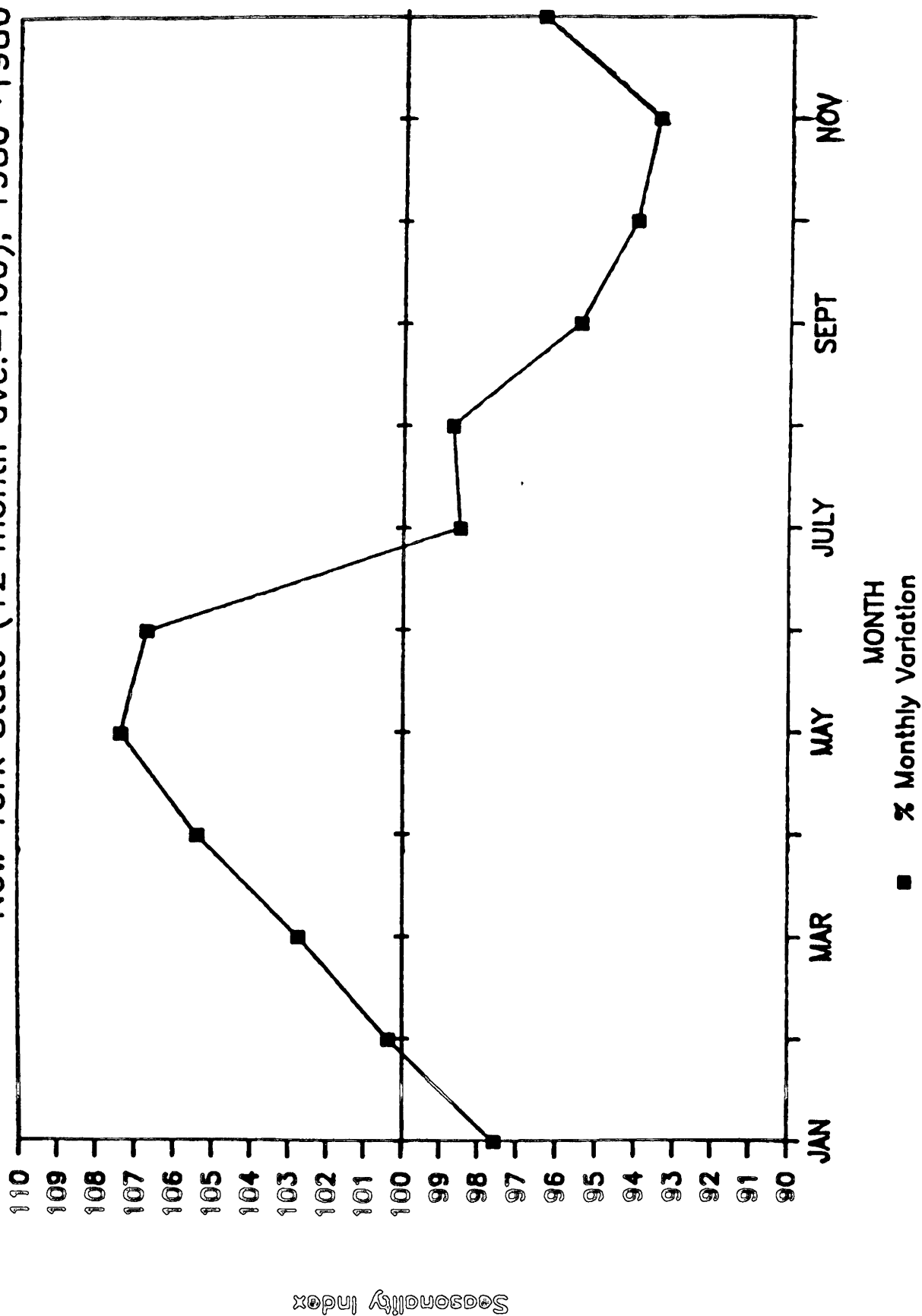
I want to make it clear at the start that it is not my intention to be an advocate on either side of the issue. I am not representing any organization today; I hope that I am representing the public interest, which I feel is my responsibility as a faculty member at a land grant institution. Thus, I will not state whether or not I feel the proposed amendment should or should not be adopted. Rather, I will discuss some of the economic ramifications of all sides of the issue to help the dairy farmers of these two Federal Orders make an informed decision.

My initial interest and motivation for research on seasonality stems from the fact that seasonality is one of the most important problems currently affecting the future competitiveness of the Northeast dairy industry relative to other regions of the country. I want to begin by elaborating on what seasonality is and why it is a problem to the Northeast.

The term "seasonality" refers to a pattern of milk production characterized by higher levels of production in the spring than in the fall. To illustrate, consider Figure 1 which shows monthly milk production as a percent of annual average monthly milk production for New York State from 1980 to 1986. New York milk production tends to be highest in May, with almost 8% more raw milk being produced than the 12 month average, and lowest in November, with almost 7% less raw milk produced than the 12 month average.

This 15% gap between the lowest and highest production months only partly illustrates the problem of seasonality. In order to see the real extent of the problem, one needs to look at monthly variations in raw milk supplies available after the fluid needs are met, especially for the "hard" Class II products. Since many states in the Northeast have relatively high fluid utilization, and since raw milk usually satisfies fluid needs first, the excess raw milk left over for hard prod-

Figure 1. Variation in Milk Production
 New York State (12 month ave.=100), 1980-1986



uct manufacturing is significantly more seasonal. For example, in 1985, daily receipts for the three largest Class II dairy plants in Federal Order 2 were more than 38% higher in May than November. It is clear that seasonality is a far greater problem for Class 2 than Class 1 milk processors.

Why is seasonality a problem? It is a problem because it is responsible for excess capacity in plants and equipment, which are built to run at full capacity during the spring flush, but greatly underutilized during the remainder of the year. This raises processor operating costs and reduces their economic efficiency. A 1982 study by the U.S. Department of Agriculture estimated that seasonality adds an extra \$0.87 to \$1.27 cost per cwt. to processing raw milk (Ling). Most of the extra cost is due to excess plant capacity and inefficiencies in milk hauling. This study was based on a hypothetical cooperative that processed 2 million pounds of raw milk per day into fluid products and 2 million pounds into hard products.

Who are the losers due to seasonality? The inefficiencies due to seasonality hurt dairy processors competing for share in the national Class 2 market. The hard dairy product market is national in scope and very competitive. The Northeast as a region will have to make gains in cost efficiency if they are to maintain their national market share in the future. Seasonality hurts the consumer since the added costs of seasonality are often passed along in the form of higher prices. They hurt the taxpayer since spring surplus milk is purchased by the federal government through the dairy price support program. They hurt the dairy farmer who is a member of a cooperative because cooperatives usually are the within year "balancers" of seasonality. And they hurt the independent dairy farmer because of the price fluctuations it causes. In short, seasonality is everyone's' problem in the Northeast to some extent.

Recognition of this problem is evident by the fact that Federal Orders #1

and #2 have operated a seasonal price incentive plan for some time now to try to mitigate seasonality to some degree. Since 1967, Federal Order #2 has operated a "take-out pay-back" plan (commonly referred to as the Louisville plan) to lessen seasonality. The level of these take-outs and pay-backs were increased only once, in 1971, to adjust for inflation. While seasonality in Federal Order #2 has been reduced since 1967, most industry leaders still feel it is a problem. This fact became clear while working on **Dairy Marketing in the Northeast**, where we interviewed over 200 leaders in the dairy industry.

With the recognition of seasonality as an important challenge to the region's competitiveness, Oltenacu, Smith, and myself posed several questions which we felt were important to research and answer. The questions that I want to answer and discuss today are the following:

- (1) What awareness do farmers have concerning the Louisville plan?
- (2) Do producers respond to economic incentives and disincentives? And if so, how would the degree of seasonality change based on alternative levels of seasonal price differentials?
- (3) What type of dairy farmers are more likely to adjust their seasonality in response to the economic incentives due to within year price differentials?
And
- (4) What type of dairy farmers are less likely to adjust their seasonality in response to the economic incentives due to within year price differentials?

To answer these, and other questions, we conducted a mail survey of some 2,465 randomly selected farmers from New York State in November 1986 through January 1987. From this sample, 1,169 (47.4%) completed or partially completed questionnaires were returned. Statistical tests for how representative this sample was of the state's 12,970 dairy farmers were conducted and the results indicated that the 1,169 dairy farmers were representative of the total

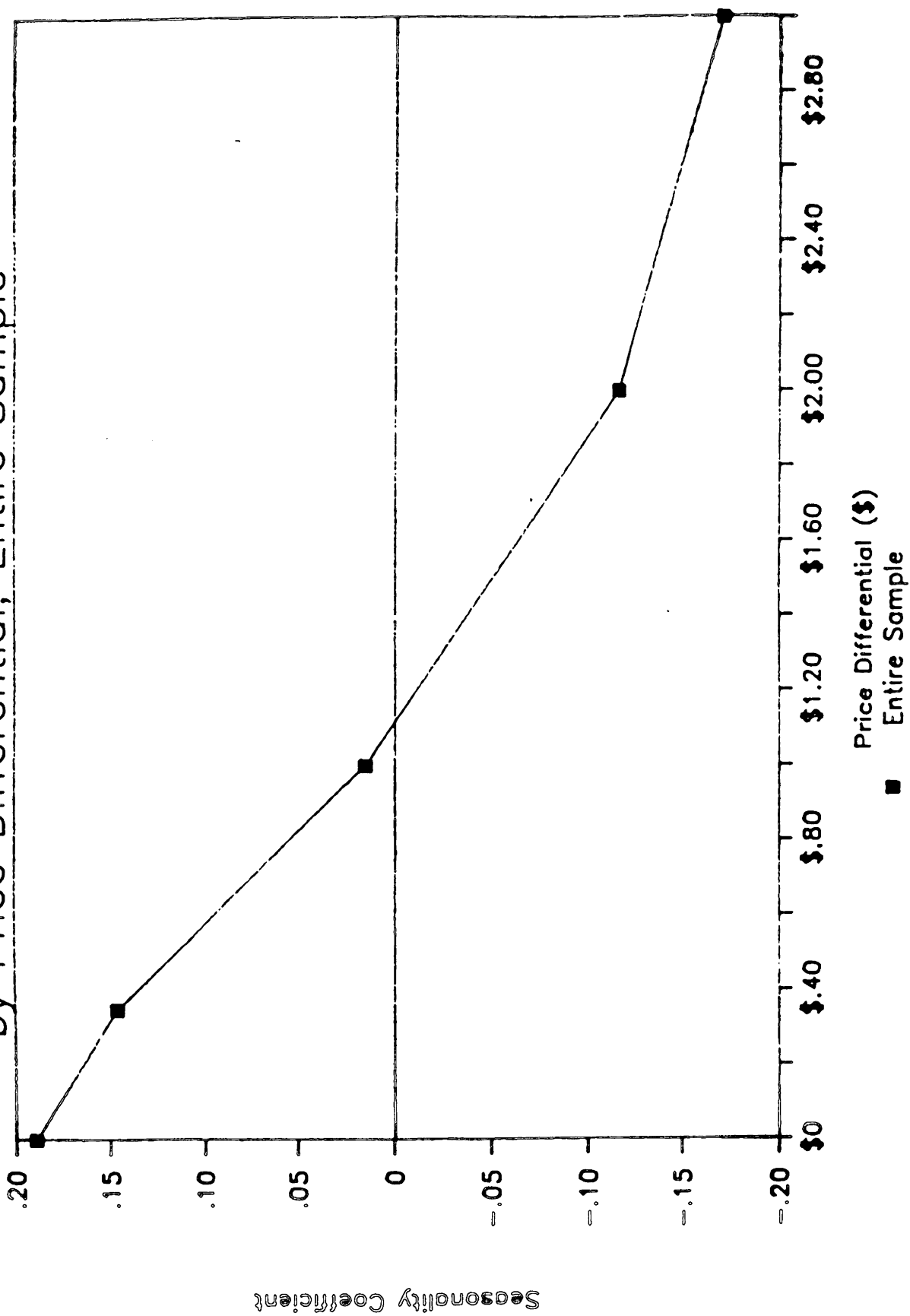
population.

To answer question 1, farmers were asked a question which concerning their awareness of the existence of the Louisville plan in Federal Order #2. Approximately 35% of the 1,169 farmers were unaware that the Louisville plan existed. This figure was not surprising to us because the deduction and premiums in the spring and fall are not reported on farmers' milk checks. While a high degree of unawareness is not surprising, the implications of this are extremely important. If producers are unaware of the Louisville plan, then one should not expect them to change their patterns of seasonality.

The answers to the remaining questions boils down to determining farmers' within year supply response to different levels of price differentials. We estimated this supply response based on a hypothetical seasonal price plan which deducted a certain amount from the milk price in the first six months of the year, and added it back during the second six months of the year. Producers were asked what percent of their annual production would they produce in the first six months and in the second six months of the year for each of four alternative differentials: \$0.00, \$1.00, \$2.00 and \$3.00. These semi-annual responses were then disaggregated to monthly responses by using each farmers actual monthly milk production patterns averaged over 1980-86. All farmers' responses were then aggregated to simulate how the entire state's milk supply seasonality would vary with a seasonal price differential ranging from \$0.00 to \$3.00.

Figure 2 illustrates the simulated relationship between production seasonality, as quantified by the "seasonality coefficient," and alternative price differentials. The seasonality coefficient (SC) measures the percentage difference between spring and fall milk production, e.g., $SC = .10$ means that 10% more milk is produced in the spring than in the fall. Each price differential

Figure 2. Estimated Seasonality Coefficient
by Price Differential, Entire Sample



reflects the level of the deduction or premium to the price rather than the total seasonal difference in price. For instance, a \$1.00 differential means that \$1.00 is deducted from the price in the spring, and \$1.00 is added to the price in the fall so that the total seasonal swing in price due solely to this plan is \$2.00. Figure 2 shows that producers do respond to economic incentives and disincentives by adjusting their degree of seasonality. Under no plan, i.e., a \$0.00 differential, the simulation results indicate that the New York milk supply would have been 19% higher in the spring than in the fall of the year on average over 1980 through 1986. At a price differential equal to the actual Louisville plan (\$0.35), the New York milk supply was 15% seasonal. Our results also indicated that it would take a price differential of \$1.12 to completely balance spring and fall production. This amount is 3.2 times more than the actual price differential under the Louisville plan.

It is interesting to also note the pattern of the relationship among alternative price differentials. The pattern in Figure 2 indicates that farmers are most sensitive to change their seasonality in the price differential range of \$0.35 to \$1.00. This is reflected by the slope of this relationship being the steepest within this range. This suggests that the a price differential between \$0.35 and \$1.00 will yield the largest marginal change in the state's milk supply seasonality.

The same analysis was conducted for different types of New York farmers classified on the basis of different farm and socioeconomic characteristics. With respect to farm characteristics, farmers who were members of Dairy Herd Improvement, had larger herd sizes, greater production per cow, and who relied less intensively on pasture feeding were found to be more responsive to reducing their seasonality within the lower range of price differentials than counterparts in the sample. With respect to socioeconomic characteristics, younger and more educated farmers were found to be more responsive to reducing their seasonality

within the lower range of price differentials than counterparts in the sample. These results supported our hypothesis that the more efficient, more innovative, and better managed farms in New York State are more able to make the adjustments necessary to take advantage of the economic incentives offered by price differentials.

There are several important points worth noting. Almost everyone would agree that the \$1.12 price differential estimated in this research to completely balance seasonality is too high. Most would agree that the objective is to lower, not necessarily eliminate seasonality completely. On the other hand, the present price differential under the Louisville plan is probably too low, since it has not been adjusted since 1972. In real terms, the current differential is far lower than it was in 1972. For example, when deflated by the consumer price index, the \$0.35 differential today is less than one-half of what it was in 1972. Consequently, a plan that substantially raises this differential, be it Louisville or Base-Excess, is probably a reasonable and acceptable idea to most. Based on the empirical estimates of expected production response in Figure 2, if the \$0.35 differential was increased to \$0.70, seasonality would fall from 15% to 8%, reducing seasonality to one-half its current level. The same result could be accomplished with a Base-Excess program, if the differential was equivalent to this.

Based on my research, I feel that if the goal of dairy policy is to further reduce the current level of seasonality, then the current program should be modified or changed in a way that increases the level of financial incentives and disincentives to discourage seasonal production. On the other hand, I recognize that some individuals are content with the current program and the current level of seasonality. Therefore, my final remarks will focus on the economic consequences of adopting the proposed Base-Excess plan vs. continuation of

the present Louisville plan.

Would the proposed Base-Excess plan reduce aggregate milk seasonality more than the current Louisville plan? Unfortunately an empirical answer to this question is not possible for the following reason. While the base and excess prices can be estimated, the blend price under the Base-Excess plan will depend upon one's seasonality. That is, producers marketing less excess milk will receive a higher blend price than farmers selling more excess milk. Unlike the Louisville plan, the farm price under the Base-Excess program will differ for each farmer based on his or her proportion of excess marketings. There are, however, several non-price factors which suggest the Base-Excess plan may be more effective in reducing seasonality.

First, all farmers would have knowledge of the Base-Excess program if it was operating in Federal Orders #1 and #2. This is due to the fact that each producer would be assigned a base. On the other hand, over one-third of the producers surveyed in our study did not know what the Louisville plan was. Obviously if producers are unaware of a seasonal pricing plan, they will not alter their individual seasonality. Because virtually all farmers would be aware of the Base-Excess, this would have a positive impact on reducing aggregate seasonality. This is one advantage of the Base-Excess plan over the Louisville plan.

Second, the Base-Excess plan provides greater financial incentives for the most seasonal producers to reduce their seasonality. Table 1 presents the actual 1987 blend price for the Louisville plan and shows what the blend price would have been in 1987 had the Base-Excess proposal been in effect for farmers with different levels of seasonality for Federal Order #2 farmers. It is clear that farmers marketing 10% or less milk in excess of their base are better off under the Base-Excess plan since they receive a higher price than the Louisville plan.

Table 1. 1987 Louisville Blend Price and Base-Excess Blend Price by Seasonality Level.

		-----PERCENT BELOW OR ABOVE BASE-----						
		-30%	-20%	-10%	0%	10%	20%	30%
		1987	1987	1987	1987	1987	1987	1987
		LOUIS-	BASE-	BASE-	BASE-	BASE-	BASE-	BASE-
		VILLE	EXCESS	EXCESS	EXCESS	EXCESS	EXCESS	EXCESS
		BLEND	BLEND	BLEND	BLEND	BLEND	BLEND	BLEND
		PRICE	PRICE	PRICE	PRICE	PRICE	PRICE	PRICE
1987								
JANUARY	12.76	13.21	13.10	12.98	12.87	12.76	12.64	12.53
FEBRUARY	12.42	12.94	12.81	12.69	12.56	12.43	12.31	12.18
MARCH	11.92	12.70	12.56	12.43	12.30	12.17	12.04	11.90
APRIL	11.55	12.37	12.25	12.14	12.03	11.92	11.81	11.69
MAY	11.30	12.18	12.08	11.98	11.88	11.78	11.68	11.58
JUNE	11.35	12.18	12.09	11.99	11.90	11.81	11.71	11.62
JULY	11.96	12.32	12.23	12.15	12.06	11.97	11.89	11.80
AUGUST	12.44	12.09	12.09	12.09	12.09	12.09	12.09	12.09
SEPTEMBER	12.75	12.30	12.30	12.30	12.30	12.30	12.30	12.30
OCTOBER	12.80	12.36	12.36	12.36	12.36	12.36	12.36	12.36
NOVEMBER	12.69	12.42	12.42	12.42	12.42	12.42	12.42	12.42
DECEMBER	12.21	12.70	12.58	12.47	12.35	12.23	12.12	12.00
AVERAGE	12.18	12.48	12.41	12.33	12.26	12.19	12.11	12.04

On the other hand, farmers averaging more than 10% excess milk marketings receive a lower price under the Base-Excess proposal than the Louisville program. Moreover, the more seasonal the producer, the harsher the penalty. This is important because even if 90% of the markets' dairy farmers produce milk uniformly throughout the year, the remaining 10% of dairy farmers can cause severe aggregate milk seasonality if they are extremely seasonal. On the same token, programs that are successful in evening out the most seasonal producers can lead to substantial reductions in total seasonality. This is an important distinction between the two plans with respect to lowering marketwide seasonality.

Finally, there may be a psychological effect of the Base-Excess plan which may reduce seasonality. This psychological effect is due to the base assignments farmers would receive under such a program. All dairy farmers will be aware of what their bases are. This may cause some dairy farmers to become more aware of the level of their excess (over-base) monthly sales. Under the Base-Excess plan, some farmers may become more astute at minimizing excess sales, not only for keeping the price penalties minimal, but also for positive psychological factors which accompany the successful feeling of "staying within base."

To summarize, it is difficult to predict whether the Base-Excess program would lead to greater reductions in marketwide seasonality because individual farm prices will vary depending upon their seasonality. However, there are three non-price effects of the Base-Excess plan which may lead to further reductions in seasonality: (1) greater producer awareness, (2) greater financial incentives for highly seasonal producers, and (3) a possible psychological effect due to the base assignment.

The effects of seasonality aside, what are the other pros and cons of the

current program vs. the Base-Excess proposal? There are two advantages of the current Louisville plan compared with the Base-Excess program. First, the Louisville plan is somewhat less restrictive with respect to production decisions by farmers. Farmers don't have to worry about producing over-base milk during eight months of the year as they have to be concerned with under the Base-Excess program. Also, since the price reduction during the four spring months applies to all milk, farmers management decisions are geared more towards lowering the entire four month production rather than making individual monthly adjustments. The second advantage of the Louisville plan is that it is less complex and less costly to administer than the Base-Excess plan. The Market Administrator does not have to compute bases for all farmers in the market. Nor does he have to calculate each farmer's level of monthly excess milk marketings. Given the size of the New York-New Jersey and New England Federal Orders, this could be a fairly complicated and costly prospect especially given that it would have to be done on a monthly basis.

Ignoring its impact on reducing seasonality, the major advantage of the Base-Excess program over the Louisville plan is that the former does not tie up large amounts of money during the spring. Many farmers face tight cash flow constraints during the spring and could use the extra cash that the Louisville program takes during the spring. Some may also view the disadvantage of the Base-Excess plan being more restrictive as an advantage. That is, some farmers will be forced to become better managers because of the added restrictions which accompany the Base-Excess program. The fact that farmers will have to monitor their bases may improve their managerial abilities and production efficiency.

The purpose of my testimony today was to present some results of my research on the impact of milk production seasonality on the Northeast dairy

industry, and the economic implications of seasonal price incentive plans designed to lessen seasonality in the Northeast. I hope that my remarks will add information to the Federal Order decision making process which will follow. I would like to thank you for this opportunity to be heard. This concludes my direct testimony.