MILK PRICING
POLICY AND PROCEDURES

PART II

ALTERNATIVE PRICING PROCEDURES

REPORT OF THE
MILK PRICING ADVISORY COMMITTEE
U.S. DEPARTMENT OF AGRICULTURE

March 1973
March 9, 1973

Mr. Clayton Yeutter
Assistant Secretary of Agriculture
Marketing and Consumer Services

I am pleased to transmit to you the second and final report of the Milk Pricing Advisory Committee. This Committee was established to develop and analyze alternative pricing procedures for milk.

The first report, released in March 1972, established that conversion from Grade B to Grade A production is occurring at a rate which will likely make it impossible to obtain reliable competitive pay prices for milk within the decade.

This report summarizes the Committee's analysis of alternative procedures. It also makes specific recommendations for changes in pricing procedures. Special attention has been given to outlining the basis for the Committee's conclusions and recommendations. We have, however, attempted to point out the arguments on both sides of the issue. In doing this it is hoped that a better basis will be provided for thorough discussion and analysis of the issues by industry and government officials.

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I. SUMMARY and CONCLUSIONS

The problem dealt with in this study is the development and analysis of alternative procedures for adjustment of prices administered under Federal orders. The study was conducted and reported in two phases. The initial report was released on March 20, 1972. It contained the Committee's perception of the milk pricing problem, the need for a change in pricing procedures, and the economic and legislative constraints imposed upon such procedures. Extensive discussion of the first report set the stage for the analysis which went into developing this second and final report.

Central to this study is the realization that in the not too distant future, there will no longer be a competitive pay price due to the gradual but persistent conversion to a single grade of milk and association of this milk with Federal order pools. This together with structural change in the processing industry will eventually make it impossible to obtain a reliable competitive pay price. These competitive pay prices, as revealed in the Minnesota-Wisconsin price series, and previously the Midwest condensery series, have been the prime mover of Federal order prices since the early 1950's. The purpose of this study is to develop alternative procedures and evaluate their usefulness in the contemporary milk market setting.

Two basic laws undergird the structure of producer prices in the dairy industry. The Agricultural Act of 1949 provides for supporting the price of milk between 75 and 90 percent of parity. Its purpose is to provide prices which will ensure an adequate total supply of milk. It, thereby, directly benefits both manufacturing and fluid grade producers throughout the country. The Agricultural Marketing Agreement Act has a dual role of assuring adequate fluid grade milk supplies and maintaining orderly marketing. Inherent in both laws is the concept of maintaining a relative balance between the supply and demand for milk.

As we move toward a single grade of milk, the purposes and function of the price support and Federal order program become more closely intertwined. The basic goals of ensuring an economically viable milk production process, assuring an adequate supply of milk, and an orderly flow of milk supplies through the market system do not change. The latitude for accomplishing these goals does change, if the support price objective changes from one of supporting the price of manufacturing grade milk to supporting the price of all milk. To do this, the prices for any milk use can be raised or lowered.
The full impact of the situation where all milk is a single grade is not readily determinable. Implications extend to pricing, pooling, classification, and allocation of milk supplies to various uses. The Committee had neither the vision nor the time to take full cognizance of these changes and implications. It instead concentrated on analyzing price movers for the more immediate future when reliable competitive pay prices disappear.

Two assumptions have been basic throughout the study: (1) A single national mover of Class I prices is to be applied to all Federal order markets. Such a mover would simply pick up from the current level of prices in Federal orders and adjust prices over time as prescribed by the mover. (2) Producers are free to adjust their production in response to changes in the level of prices and returns. Such adjustments are assumed to be uninhibited by effective controls on production.

Alternative Class I Pricing Procedures

Three basic alternative procedures were analyzed—economic formulas, product formulas, and hearings. None of these procedures are new in the sense that they have all been used before in Federal order pricing in at least a limited number of markets. The Committee benefited from the lessons of past experience in attempting to devise new ways of applying these pricing procedures and analyzing their strengths and weaknesses as a national mover of milk prices.

Economic Formulas

An economic formula ties or relates the price of milk directly to economic factors such as the cost of feed, labor, and other inputs which affect the supply of milk and factors such as income, population, prices of substitute products, and Government food distribution requirements which affect the demand for milk and its products. Economic formulas have been used in a limited number of Federal order markets. They have been proposed as a national mover of milk prices.

Two types of economic formulas were analyzed as movers of Class I prices in Federal orders—an economic index formula and an economic equilibrium formula. The economic index formula attempts to capture in a single economic equation or formula an appropriate relationship between milk prices and factors affecting milk production and consumption. Such factors have typically included indexes of prices paid by farmers for inputs, prices received by farmers for other products, the general price level, and the purchasing power of consumers.
Economic formulas used in the Northeast in the 1950's, the National Milk Producers Federation formula proposed as a national mover of Class I prices in 1970, and an index formula developed for illustrative purposes by the Committee are examples of such economic index formulas. An alternative to an economic index formula is an economic equilibrium formula. Such a formula contains separate milk consumption and production equations. When the production and consumption relationships are set equal to one another, they would conceptually generate prices which yield a relative balance of milk supplies and needs. This is an advantage which is not ensured by an economic index formula.

Product Formulas

Product formulas utilize product prices, yields per hundredweight and manufacturing costs to estimate the value of a hundred pounds of milk utilized in hard manufactured dairy products such as butter, powder, and cheese. In effect, they measure what a manufacturing plant operator can afford to pay for milk with given product prices, yields, and manufacturing costs. They are contrasted with competitive pay prices which measure what plants actually do pay producers for milk. What plants do pay is influenced by competition among plants as well as prices, yields, and costs.

Product formulas can either be a butter-powder formula, a cheese formula, or a combination of the two. The prices generated by a combination formula more closely approximates those generated by a competitive pay price series such as the Minnesota-Wisconsin price. The combination formula provides a broader measure of manufacturing milk values than either a butter-powder or cheese formula.

Hearings

A national hearing could be used as a method of establishing the appropriate level of Class I prices. Conceivably, such a hearing could be held before the milk support price decision, receiving testimony on both support and Federal order prices. Alternatively, the hearing could be held after the support price announcement and cognizance taken of the support price decision.

If more frequent than annual price changes are desired, a hearing approach could be combined with either an economic or product formula. Such an approach would recognize the imperfections in either pricing procedure and assert a public need for continuous review of their performance. Increased Government participation in
terms of direct testimony on economic conditions and their implications for pricing policy and cross-examination may be necessary for the development of a complete and unbiased record.

**Evaluation of Alternative Class I Pricing Procedures**

The Committee utilized six criteria in evaluating the alternative procedures for establishing Class I prices. These criteria are:

1. Maintaining a supply-demand balance;
2. Providing increased price stability while maintaining responsiveness to economic conditions;
3. Maintaining producer returns;
4. Providing coordination and consistency with actions under other Government programs;
5. Utilization of a system consistent with the state of the arts and data availability;
6. The need for producer understanding of and confidence in Federal order pricing techniques.

The criteria were separately applied to each of the alternative procedures. However, this is the first opportunity in the report to make direct comparisons among procedures for each criterion. Such comparisons necessarily contain many qualitative and judgmental aspects. The evaluation is more closely associated with pricing during the immediate period when transition to one grade of milk is occurring than it is with the situation a decade or more down the road when transition is complete.

**Supply-Demand Balance**

Maintaining a national supply-demand balance is central to the purpose of Federal Government involvement in the dairy industry. Such a balance recognizes: (1) The consumers demand for milk and dairy products and the willingness of dairy farmers to produce milk; (2) That, with gradual movement toward a single grade of milk, Federal orders are increasingly being relied on as a source of milk for manufacturing as well as for fluid purposes; and (3) Limits exist on the amount of Government funds available for the price support program.
The use of competitive pay prices as a Class I price mover in Federal orders has provided automatic adjustment of milk prices to changed supply-demand conditions in the dairy economy. Changes in competitive pay prices are a reflection of total supply and demand conditions in the dairy industry. They are influenced by the availability of milk for manufacturing purposes which, in turn, is a function of the total supply less the quantity sold for fluid use.

Product price formulas provide this same degree of automatic price adjustment to changing supply-demand conditions in the milk industry as a whole. This sensitivity exists because of the residual status of dairy product markets. This reflection of supply-demand conditions can be expected to exist even after conversion is complete as long as product markets continue to function in a competitive manner.

Tying Class I prices directly to product prices allows nearly immediate reflection of changes in national supply-demand conditions for milk to producers in terms of the prices they receive. Economic index formulas have no built-in mechanism for assuring price adjustments in response to changes in the overall supply-demand balance in the dairy economy. There has been a tendency for such formulas to produce an upward price bias which is not reflective of supply-demand conditions in the residual market for manufactured products. While such an upward bias can be remedied by the inclusion of different factors in the formula, the assurance of prices which would work in the direction of maintaining a long-term supply-demand balance does not exist.

Economic equilibrium formulas appear to have substantial potential for meeting the needs for supply-demand balance while considering other factors in pricing--particularly those affecting the longer term supply-demand balance and economic viability of the industry. Research to develop such formulas is in its infancy. The efforts of this Committee in this area were more conceptual and exploratory than they were successful. Our efforts do, however, appear to justify substantial additional research input into developing workable economic equilibrium formulas.

Hearings provide the opportunity for consideration of a broad variety of factors in pricing decisions. Such consideration would, of course, include supply and demand conditions. When a single grade of milk exists, a hearing considering both the support and Federal order prices would allow complete and simultaneous consideration of both class price levels and differentials. The hearing
process, however, has the disadvantage of the subjectivity to non-economic considerations, and its potential lack of an immediate response to changing economic conditions when compared with formula pricing.

Stability

As an aspect of orderly marketing, Federal orders and price supports were established to give greater price and income stability than would exist in an open and unregulated market.

While short- and long-term price stability is desirable, complete price stability ignores the fact that economic relationships do change. In fact, in order to have long-term price and income stability, the pricing system must be responsive in the short term to such changes in economic relationships. The degree of responsiveness must be calculated to minimize short-term price fluctuation while maintaining longer term stability.

While stability is a goal of milk pricing policy, cycles of production and prices continue to periodically exist in the dairy industry. These cycles are major contributors to low producer prices and returns such as existed in the early 1960's. Some suggest a national Government program of supply management is the only method of dealing with this problem.

A pricing solution to the problem of cycles of high production and low prices as an alternative to stringent Government controls on production, may also exist. Such a solution, if it is to exist, necessarily involves: (1) coordination of price support and Federal order decisions, (2) greater anticipation and analysis of the short-and long-term impact of pricing decisions, and (3) a willingness on the part of producers and their cooperatives to objectively analyse and allow implementation of economic decisions.

Two alternative pricing means exist for providing increased long-term price and income stability. First, better information is needed on changes that affect supply and demand conditions, and the probable impact of these changes. This requires substantially increased economic input into Federal order and price support decisions. During the past two years, substantial progress has been made in providing increased economic input into price support decisions. An annual Economic Research Service study of the impact of alternative dairy price support levels is an example of such increased economic input.
The impact of price support decisions is automatically reflected in both surplus and Class I prices if product price formulas are used to move Federal order prices. The burden of price reductions and the benefit of price increases are shared equitably by all milk producers—regulated or unregulated, fluid or manufacturing grade.

Obtaining a balance between the stability and responsiveness is a factor which creates a preference for using a composite butter-powder-cheese formula compared to a cheese or butter-powder formula as a mover of Class I prices in Federal orders. During the 1970-72 period, returns from cheese were higher than from butter and powder. Butter and powder was, therefore, the lowest revenue generating use. It was, therefore, the true residual market for milk. It can be argued that it is therefore the best reflector of industry supply-demand conditions. However, when product prices are above the support level, a composite formula adds an element of stability to price sensitive individual product markets. When the price of one product is resting on the support level, a composite formula allows for more immediate reflection of changes in economic conditions and manufacturing milk values generally. The stability provided by the price support program may therefore have the effect of retarding adjustment in prices to changed conditions if too narrow a manufactured product basis is used for pricing.

In the longer term, it is important that changes in efficiency should be reflected in make allowances. A technological and structural revolution continues to occur in the manufactured products industry as plants consolidate and marketing commitments change. Regular review and analysis of appropriate make allowance must be an integral part of an effective and responsive product price formula. As we move toward a single grade of milk less justification would appear to exist for differences in make allowances between the price support program and Federal orders.

The second alternative involves integration into the Class I pricing system of greater anticipation of changes occurring in the economics of milk production and consumption. This could potentially be accomplished either by utilizing economic formulas or hearings. Such economic formulas would necessarily need to contain variables which have been demonstrated to predict or anticipate changes in milk supply and demand with the correct weights assigned to each variable. While the need is apparent and the potential payoff great, the fact is that we do not know enough about the economics of milk production and consumption to develop such formulas. The formulas that have been developed by this Committee, used previously in Federal orders, or proposed, either generate greater short-term
instability, or provide no assurance that too much production will not exist in the longer term. In addition, formulas which place emphasis on Class I price changes to obtain production adjustments result in inherently inequitable treatment of manufacturing and fluid grade producers as well as producers in high and low utilization markets, as long as substantial differences in utilization among markets exist.

Hearings present the potential for a combination of two alternatives. While ensuring periodic evaluation of economic conditions, they imply less frequent price changes, and, therefore, greater short-term price stability. They provide an opportunity for greater public participation than relying on price supports and product price formulas. They also require a higher level of economic analysis on the part of the participants in the hearing than has been evident in many hearings. They also inject subjectivity, judgment, and generate pressures which strain objectivity in pricing decisions.

Maintaining Producer Returns

Maintaining reasonable producer returns for the purpose of generating adequate milk supplies is a major objective of both the price support and Federal order programs. That economic formulas can be developed, and for that matter have been utilized, to obtain higher levels of producer returns is evident. While a short-term increase in producer returns results from application of such price-enhancing formulas, the long-term consequences—surpluses, low prices, and removal of excess capacity from the industry—are considerably less favorable.

The point is, in the long-term, the National level of returns generated by an economic formula would be no higher than will be generated by a product formula or hearing procedure. In fact, if the effect of an economic formula is to generate unduly high prices in the short term, total producer returns in the longer term must necessarily be sacrificed to maintain adjustment. The full impact of such lower returns is moderated only by the operation of the price support program which tends to absorb a portion of the errors in pricing. In a free market, returns to producers can be enhanced only by striving for greater industry stability and continuous adjustment. If returns generated in this manner are not deemed reasonable, production controls are required.
Coordination and Consistency with other Government Programs

The Secretary of Agriculture is responsible for many different programs designed to stabilize farm prices and raise producer incomes. The milk price support program is most closely related to the Federal order program. The price support program relates changes occurring in other segments of agriculture and the general economy through the requirement to support the price of milk at a level between 75 and 90 percent of parity as will generate an adequate supply of milk.

The close relationship between the objectives of the milk price support and Federal order program requires close coordination between the two programs. This coordination is most easily and directly accomplished by use of a product price formula. Consistency of Government action is automatically assured.

The hearing procedure also has the potential for developing a coordinated price policy. Such coordination is implicit in considering both price support and Federal order decisions at the same time or in following a price support announcement with a Federal order hearing. This degree of coordination becomes increasingly essential as we move toward a single grade of milk.

Such direct and automatic coordination is not implied in an economic formula unless manufactured product prices are a prime consideration in the formula--in which case a product formula is being used under the name of an economic formula. Over time, if the price support decisions and economic formulas are based upon the same economic facts and analysis, closer coordination between the two decisions will automatically tend to result.

State of the Arts and Data Availability

The technology does exist to develop adequate and workable economic formulas. What is lacking is both an understanding of the factors and relationships affecting milk production and consumption and, in many instances, data to quantify those relationships. Economists have not been very helpful. In fact, pitifully little research is being done in this area--particularly in the universities and in industry. What is being done by the Economic Research Service relates principally to this project or the price support analysis. Considerably greater concentrated effort is needed for workable alternatives to be developed.
The data problem is not limited to economic formulas. The same data and relationships are needed to develop good economic formulas as are needed to make a hearing procedure work and to make intelligent price support decisions.

The data problem also extends to product price formulas. Improved price reporting and supervision of trading on the Wisconsin Cheese Exchange is needed to assure competitive product prices. Maintaining make allowances which are current requires yearly review and updating. These problems appear to be easier to overcome in the short term than those associated with economic formulas.

Understandable Pricing Concepts

Producer understanding and confidence is important in any Government action. It is particularly important when two-thirds of the producers must approve an order before it is activated. Understanding is largely a function of education. Economic formula pricing is inherently complex. Simple economic formulas can be devised. But their simplicity is most frequently also reflected in their performance. Economic equilibrium formulas are particularly complex. They require more work to develop and will require more work to create the understanding needed to get them adopted.

Product formulas are a step away from competitive pay prices. Both are, in a sense, automatic national supply-demand adjustors. Some producers, economists, and cooperative leaders apparently have difficulty understanding the need for a tie between manufactured product prices and Class I prices. Explanations frequently do not make adequate distinction between the role of a price mover and the role of Class I differential—the difference between the Class I price and the surplus price. A product formula assumes a specified set of Class I differentials for various markets. Note, however, that an economic formula makes the size of the Class I differential variable and a function of the prices generated by the formula.

As we move toward the situation where all milk is Grade A, the rationale which has traditionally been used for determining the size of the Class I differential relative to manufacturing milk values must be reoriented. This rationale was that to attract adequate supplies of Grade A milk to a market it was necessary: (1) to provide a Class I differential reflecting the cost of transporting bulk milk from the supply area to a market; and (2) to provide a Class I differential which when reflected in the blend price would provide a price sufficiently high enough to cover the
additional costs of producing Grade A milk and assure an adequate, but not excessive supply of milk for a defined marketing area.

When all milk is Grade A, this rationale is no longer relevant. Even today, individual markets are losing their identity and the market for fluid milk is regional in character and has some characteristics of a national market.

In a single grade of milk environment, the decision as to the appropriate level of class prices and therefore the appropriate Class I price differential is basically one of on what products the revenue needed to generate an adequate supply of milk falls.

The need to subject class price relationships to more careful economic analysis when a single grade of milk exists is obvious.

It involves consideration of a combination of factors: (1) The need to generate revenues adequate to support required level of production; (2) the nature of demand for individual products including price, income, and substitution effects; and (3) the long-term goal of maximizing total milk solids consumption consistent with the public interest. Such a policy should include pricing milk to encourage increased production and consumption of milk protein while valuing milk fat at a level more competitive with its substitutes.

Assuming such careful analysis and consideration, there are a number of alternative procedures for adjusting class differentials in combination with product formulas. One approach would be to move the Class I price up or down with a product formula and adjust Class I differentials on the basis of a National hearing. Such a hearing could be held regularly--annually, for example--or it could be held whenever economic study indicates a need for change.

Another approach would involve moving prices with a product formula but adjusting class differentials by some type of economic formula or model. Such a formula or model would be largely concerned with reflecting changes in demand relationships among products.

A hearing procedure has the advantage of an opportunity for simultaneous consideration of the appropriate level of prices and the appropriate Class I differential. It also provides greater opportunity for individual producer input. The rationale of a pricing decision resulting from the hearing procedure would be contained in a written recommended decision which would be subject
to critique and additional input by written exception. However, when all is said and done, the rationale for the decision might be more obscure and less understandable than in the case of either a product formula or an economic formula.

**Surplus Pricing**

There are a maze of issues which this Committee could analyze in the case of surplus pricing. These issues range from uniformity of prices among markets to service charges, and the appropriate number of price classes for surplus products. The resolution of these issues is far more complex than the mechanics of development of an appropriate formula, or formulas, for pricing surplus milk. Detailed recommendations as to surplus pricing formulas can be made only after these basic issues have been resolved.

This Committee was charged primarily with the problem of analyzing alternatives to the Minnesota-Wisconsin price series as movers for Class I prices. Therefore, it did not address this multiplicity of surplus pricing issues.

However, the implications of conversion to a single grade of milk are as apparent in the case of surplus pricing as they are in the case of Class I pricing. A national substitute mover of surplus prices will need to be established.

In establishing such a substitute procedure, the following principles must be recognized: The residual market for manufactured products must clear. To do this, product prices must be flexible. Surplus milk prices must, in turn, closely track revenues from manufactured products or economic distortions will result.

The Committee therefore concludes that, in the absence of reliable competitive pay prices, strong consideration should be given to product price formulas as a substitute for the Minnesota-Wisconsin series in establishing Federal order surplus class prices. The incentives provided by a composite butter-powder-cheese formula argue for its appropriateness as a mover of surplus prices. Consideration might also be given to weighting the butter-powder and cheese components to give consideration to the uses made of surplus milk in various markets. Another alternative involves the establishment of a separate butter-powder class.
Concluding and Transitional Recommendations

The Committee concludes that product price formulas offer the greatest potential for solving the immediate pricing problems created by conversion to a single grade of milk. Such formulas and related class price differentials should be periodically reviewed by the Department and in hearings to evaluate their performance and make appropriate adjustments.

The Committee, in addition, concludes that a composite butter-powder-cheese formula is the appropriate Class I price mover. It recommends continuation of monthly pricing under Federal orders without brackets. It recommends that the Department begin preparing for transition to a product price formula as a mover of the prices of milk in all Federal order classes. The purpose of these concluding remarks is to suggest a blueprint for implementation of a Federal order pricing system based on product price formulas.

Timing

The focus of this report has been upon the situation when enough of the milk has converted to Grade A that it is difficult to obtain meaningful competitive pay prices. How much time this will take is not known.

In 1972, 24 percent of the Nation's milk supply was manufacturing grade and more than half of this was concentrated in Minnesota and Wisconsin. In Minnesota, 67 percent of the milk marketed is still manufacturing grade and in Wisconsin, 43 percent. This is still an extremely large reservoir of milk priced on essentially a competitive basis.

The Committee feels that the Minnesota-Wisconsin price still is a reliable measure of manufacturing milk values in these two States. From the standpoint of reliability there is no reason to change immediately from using the Minnesota-Wisconsin price as a mover of Federal order prices. On the other hand, conversion and plant mergers will over time make its increasingly difficult for the Department to maintain a reliable and accurate estimate of the value of manufacturing milk. In addition, industry confidence in a Government-administered pricing system is important. This is particularly true in a situation where it is generally recognized that a change will be absolutely essential sometime during the next five years. While there is general industry confidence in the reliability of the Minnesota-Wisconsin price series as a Class I
price mover, even now questions are being raised as to its continued reliability. We recommend that the Department prepare for such transition and that it be responsive to requests for a hearing on the matter of a product price formula as a substitute for the Minnesota-Wisconsin price series.

Procedural Suggestions for Product Formula Pricing

The Committee has made several points with respect to product price formulas which bear repeating since they have both procedural and preparatory implications:

1. Greater assurance of the representativeness of manufactured product prices--particularly butter and cheese--is needed. The Committee recommends that USDA begin collecting f.o.b. plant prices for butter and cheese for a representative sample of plants in the Minnesota-Wisconsin area as it already does for nonfat dry milk. It also recommends, as a safeguard to preserve a competitive market for cheese, that the Commodity Exchange Act be amended to give the Commodity Exchange Authority jurisdiction over trading on the Wisconsin Cheese Exchange, such as it presently has in the case of butter.

2. One of the most troublesome aspects of developing a product price formula is obtaining an adequate basis for arriving at a measure of manufacturing costs or make allowances and keeping them up to date. The Department and the industry cannot shirk this responsibility. The Committee considers an annual review of make allowances, on a verifiable basis, to be necessary in order to keep up with inflation, and the effects of technological change as an input to Federal order and price support decisions. Such a review of make allowances would be a helpful and needed adjunct to the price support program. The comparative advantages and disadvantages of making this job a function of the market administrators, a separate cost analysis unit within the Department, or contracting with outside parties for this service will need to be assessed.

3. Sampling procedures for f.o.b. plant prices, yield, and cost information will need to be developed. The Committee suggests that such a sample be representative of reasonably large butter-powder and cheese
plants which have a relatively continuous supply of milk available to them. The reasoning here is twofold: (1) Product price formulas to move milk prices nationally should be based on factors reflecting costs of large plants operating on a continuous basis to provide incentives for cost reduction and technological change. (2) The surplus milk pricing function of Federal orders should not become entangled with cost considerations involving the balancing function which should be dealt with as a separate issue in the public or private sector.

4. It should be clear that after implementing these recommendations, many of the problems of surplus pricing will still remain. The key issues of the surplus pricing problem such as service charges, separate manufacturing product price classes, or the extent to which surplus class prices should be uniform in all markets, will still exist. More extensive study of these problems is needed.

**Pricing Milk When Conversion to One Grade of Milk is Complete**

In many respects it can be asserted that the recommendation to move to a product price formula is not the best Class I or even surplus pricing solution for the long term. The basis for this assertion may include: (a) The failure of the recommendation to come to grips with the appropriate relationship between prices in various classes, (b) the likelihood that product prices are going to become increasingly administered by large cooperatives and other dairy firms, (c) its failure to consider that a milk supply control program might be implemented, and (d) its failure to develop pricing systems which better anticipate needed price changes.

When all milk is Grade A and pooled an important role would still be expected to exist for product price formulas. Greater administrative discretion as to relative level of class prices will have a major influence on the level of product prices. This indicates a greater need for hearings in determining appropriate price classes and class differentials.

When one grade of milk exists, product prices—particularly those in lower classes—will still be sensitive to supply and demand
conditions. They will be influenced by increases in demand for fluid milk and dairy products. When milk supplies increase or demand declines, product markets will feel the impact of residual supplies. Product markets will also be subject to changes in demand for manufactured products themselves.

One implication from this study is that a new sustained research thrust is needed to develop better understanding of milk production and consumption relationships and their implications for pricing milk and its products. Interest in economic formulas should not stop at this point. But this point is clear: greatly increased effort must go into the development of economic formulas before they should be implemented as a pricing tool.

The need that we move to a new pricing system in Federal orders is sufficiently urgent so that we cannot wait for imperfections in the alternatives to be removed. However, it is the feeling of the Committee that product formula pricing may be a viable pricing tool for a number of years to come if it is properly implemented through the cooperation of industry and Government, and supplemented by the hearing process.

Regardless of the pricing system used, good faith on the part of industry and Government will be required to make it work. From an industry standpoint, two points appear to be particularly important. First, for product price formulas to be successful, the pricing systems in product markets must function on a competitive basis. Industry and Government have a role in seeing that they do. Second, industry must assume greater responsibility for analysis and objectivity in preparing for hearings. From the standpoint of both parties, there must be increased recognition of the relationship between the price support and Federal order programs as we move toward a single grade of milk.
II. INTRODUCTION

This study was initiated with the realization that conversion to a single grade of milk creates conditions which will, within the decade, require modifications in milk pricing policies and procedures. The study's purposes were to:

1. Determine the need for new methods of pricing under Federal milk marketing orders;
2. Analyze the constraints imposed upon such pricing procedures by legislation and economic conditions in the milk industry;
3. Develop, in light of these constraints, alternative pricing procedures; and
4. Analyze their strength and weakness as national movers of milk prices.

The initial report from the study was released on March 20, 1972. It contained discussion of the Committee's perception of the milk pricing problem, the need for a change in pricing procedures, and the constraints imposed upon such procedures. The Committee benefited from many responses to the initial report. It has taken these responses into consideration in the development and analysis of alternative procedures.

This report, the final report in the series, will initially summarize the main conclusions from the first report. This will be followed by a statement of the criteria used by the Committee in evaluating the alternative procedures analyzed. The main section of the report involves an analysis of the alternative pricing procedures.

The Need for a Change

The basic factor creating need for a change in Federal order pricing procedures results from gradual but persistent conversion to a single grade of milk and the association of the bulk of this milk with Federal order pools. Conversion to a single fluid-grade milk supply will result in increased questioning of the reliability of the Minnesota-Wisconsin price series and increase difficulties
of maintaining a reliable sample that is representative of prices paid producers.

Competitive pay prices, as reflected in the Minnesota-Wisconsin price series, are a prime mover of Federal order prices. They are also used to establish the surplus price in most Federal order markets. A substitute mover for Class I prices and a basis for establishing surplus class prices, therefore, will need to be found.

**Stages of Conversion**

Conversion to a single grade of milk will not occur over night. In 1972, 24 percent of the 120 billion pounds of milk supply was still manufacturing grade and more than half of this was located in Minnesota and Wisconsin. It is likely to be at least a decade before most of the production in this area has converted to Grade A.

Pricing considerations are different in the transitional stage when a significant volume of unregulated manufacturing grade milk exists than when all milk is Grade A and pooled. In the transitional period products made from unregulated milk supplies will continue to exert considerable influence on the product markets. Competition will exist among regulated and unregulated sources for the supply of milk needed to make those products with the highest returns. Equitable sharing of price increases will need to be maintained between regulated and unregulated producers. The price support program will likely continue as an instrument supporting prices of manufacturing grade milk.

When conversion to Grade A is complete, we assume that, in one way or another, all milk will be included in some type of pooling arrangement. All producers would share in the proceeds of the fluid market and also the proceeds from various manufacturing uses would be pooled. This assumption is based upon two premises. First, as the market for fluid milk becomes regional or national in scope, all producers of Grade A milk are entitled to share in the proceeds of that market. It can, therefore, be expected that as producers convert to Grade A they will actively seek to become associated with a Federal order pool, if it offers them a price advantage. Secondly, pooling of all milk would be essential to orderly marketing.
This does not mean that all milk would necessarily have to be included in one national Federal order pool, or a group of regional Federal order pools. We see the possibility of retaining State milk orders in certain areas. However, in such instances, if State programs were retained, it would seem that pressures would develop that would require State agencies to structure their regulations in such a manner as to be compatible with Federal regulations.

When conversion is complete and all milk is pooled, we are in a different situation. The constraints placed upon the present system by a body of unregulated milk will no longer exist. With all milk Grade A the objective of the price support program in combination with the Federal milk order program becomes one of generating a price for all milk which will assure an adequate supply of milk within the price constraints of the Agricultural Marketing Agreement Act of 1937 and the Agricultural Act of 1949.

Considerably greater pricing latitude exists for satisfying this objective. The value of milk for butter-powder as opposed to cheese will no longer be of direct significance in determining the level of returns to particular producers, since proceeds from various manufacturing uses will be pooled. Producer pay prices for milk for various manufacturing uses will no longer exist to play the role of an allocator of milk supplies between uses such as butter-powder and cheese. Cooperatives, handlers, and Federal order provisions will necessarily play a larger role in the allocation of milk supplies among markets and uses.

The implications and complications of this ultimate system are complex and not easily determined. Questions of number of product classes, price level in the various product classes, and appropriate price movers are only the beginning as the area for discretionary regulatory activity is expanded.

Scope of the Study

The Committee's analysis emphasized the transitional stage. This was done because a transitional solution to the pricing problem is the most immediate need. If the transitional solution is developed with sufficient vision and in recognition of the situation which it seems likely will exist when there is one grade of milk, it will allow for an evolution in pricing toward the ultimate structure of pricing needed when all milk is Grade A and pooled. It will also allow for continuous study of the need for change and adoption of pricing procedures.
Additional limitations were made on the scope of the study to keep it down to manageable size. In concentrating on the transitional period the Committee did not study the appropriateness of the current level of Federal order prices. It instead concentrated on the problem of developing a uniform national mover of milk prices for Federal orders. Such an analysis, it was felt, would have the greatest immediate usefulness, but would also have significant implications for the situation when all milk is Grade A.

The Committee did not study a large number of pricing issues which either exist today or will likely exist when conversion to a single grade of milk is complete. This includes problems such as component pricing, regional price adjustment, pooling, service charges, and procedures for allocating milk to various uses. These are important problems which need analysis.

The Committee concentrated primarily on the problem of pricing milk for fluid use—Class I milk. However, since conversion to a single grade of milk has the same implications for surplus pricing as for Class I pricing, it also addressed in a more limited manner problems of surplus price movers. It did not consider problems of pricing any intermediate classes.
III. CRITERIA FOR EVALUATION OF ALTERNATIVE PRICING PROCEDURES

The milk pricing system must be consistent with the policies established in the Agricultural Marketing Agreement Act of 1937, as amended, and the Agricultural Act of 1949, as amended. In carrying out his responsibilities under these laws, the Secretary is charged with establishing a price structure that will assure adequate supplies of milk. The Act of 1937 specified that this be done in the context of establishing and maintaining orderly marketing conditions in fluid milk markets by avoiding unreasonable fluctuation in supplies and prices.

The adequate supply and orderliness concepts imply a standard for pricing which maintains a balance between the supply and the demand for milk. Under the price support program, the Secretary is charged with maintaining prices at a level between 75 and 90 percent of parity which will assure an adequate supply of milk and dairy products. The price support and Federal order programs presently stand as the main vehicles for insuring adequate returns to the labor, management, and capital contributions of milk producers. They cannot, however, be allowed to provide continuous support for milk prices at levels sufficiently high to generate large surpluses.

The Food and Agriculture Act of 1965 authorized the establishment of Class I base plans in Federal order markets. The authority for Class I base plans was extended by the Act of 1970. The extended authority provided for more liberal entry of new producers and for updating of bases each year. Neither the 1965 Act nor the 1970 Act changed the supply-demand balancing, parity, or orderly marketing standards for the establishment of Federal order and support prices, although the requirement to support the price of butterfat at a minimum 75 percent of parity was suspended until March 31, 1974.

The Committee concluded that six criteria were appropriate to consider in evaluating the pricing procedures analyzed in the study. The criteria are applied to the alternative procedures, using two assumptions which have been basic throughout this study:

1. A single national mover of Class I prices is to be applied to all Federal order markets for each class of milk. This has not always been the case, although the Department has tended to move in that direction. Some of the problems encountered in the past with respect to particular pricing procedures, such as economic formulas,
resulted from the fact that different procedures were applied in different markets resulting in intermarket price alignment problems. Such problems would not have been encountered were a single pricing procedure applied to all markets, resulting in simultaneous price changes in all markets of the same magnitude and at the same time. Therefore, it comes both necessary and desirable to reevaluate pricing procedures which have been utilized and eventually abandoned in the past to perceive what the experience would have been with uniform national application.

2. Producers are free to adjust their production in response to changes in levels of prices and returns uninhibited by effective controls on production. Price has historically been utilized as the basic factor controlling production. This, as discussed previously, is consistent with current legislative guides to milk pricing under the price support and Federal order programs.

**Explanation of Criteria**

With these assumptions explicitly stated, the Committee utilized the following six criteria in evaluating the alternative pricing procedures of economic formulas, product formulas, and hearings.

1. **Supply-Demand Balance** - It was a conclusion of the first report of this study that a basic objective of both the Agricultural Marketing Agreement Act of 1937 and the Agricultural Act of 1949 was that of maintaining a national supply-demand balance. Such a balance implies pricing milk at a level which recognizes the sum total of forces affecting the national supply and demand for milk and establishing prices which create a balance between the national supply and demand.

Two main questions arise in practical application of such a standard: (1) What is supply? (2) What is demand?

When the main objective of Federal orders involved supplying the fluid needs of individual markets, it became common to speak of an adequate supply of milk for a market in terms of a 20-30 percent reserve over fluid requirements. This is no longer the case. Technological changes in milk transportation and associated costs made
it feasible to rely on alternative sources of milk supply over a broad area. On the other hand, larger fluid milk processing operations bottling fewer days a week create a need for larger Grade A reserves and/or more milk storage capacity. In addition, Federal orders are increasingly being relied on as a source of milk for manufacturing as well as fluid purposes. Today, approximately 75 percent of the milk is Grade A and 40 percent of the milk used for manufacturing purposes comes from Federal order markets. The percentages will continue to increase as conversion to one grade of milk occurs and additional supplies become associated with Federal order pools.

The supply-demand balancing objective must be interpreted in light of these changes in the market for milk. Movement toward a single national market for milk when all milk will be pooled means that traditional concepts of needed reserves for the fluid market in individual Federal order markets are becoming less meaningful.

The demand for milk obviously includes the commercial demand for all fluid and manufactured dairy products. The fluid demand is satisfied exclusively out of fluid grade milk. The manufacturing demand may be satisfied out of either the manufacturing or fluid grade milk but will eventually also be satisfied out of fluid grade production. The remaining question involves the extent to which requirements of USDA for dairy products for school lunch, welfare distribution and other domestic feeding programs should be considered a part of the demand for milk. The answer is not clear-cut.

Since 1965, the quantity of dairy products distributed by USDA in domestic direct distribution programs has ranged, in terms of milk equivalent, from 1.1 to 4.6 billion pounds. Fiscal Year expenditures have run from 85 million in 1966-67 to 246 million in the 1971-72 Fiscal Year.

Some relatively small proportion of the USDA purchases of dairy products under the price support program can reasonably be considered a part of the regular demand for milk. These regular sources of demand are included with
the realization that they are dependent on the risk of both Congressional appropriation and Executive release of funds for such uses. They are also affected by a gradual shift in welfare programs to dollars as opposed to commodity distribution.

2. Stability - To an important extent, as an aspect of orderly marketing, Federal orders and price supports were established to give greater price and income stability than would exist in an open and unregulated market. While this is the case, cycles of production and prices continue as important factors resulting in surplus conditions and low prices such as existed in the early 1960's. Some would look to production control as a means of removing such cycles. Greater stability can also be accomplished, in a less regulated marketing environment, by better anticipation of needed price adjustment. There have been instances where Federal order or support price adjustments have not been made until surplus conditions or substantial production reductions have occurred. Better forecasts of future developments in the milk industry are needed to implement changes in pricing policies at as early a date as is feasible. If such a pricing procedure can be developed, political and administrative flexibility must exist to adjust prices in the near term in favor of longer term adjustment and price stability.

Stability has a seasonal as well as a long-term supply-demand balance context. The pricing system should not accentuate the tendencies toward surplus production in the spring and deficit production in the fall. On the other hand, a general mover of national prices should not be the main mechanism by which seasonal production cycles are minimized. Separate seasonal pricing plans that are closely coordinated among markets should be utilized to accomplish such objectives when necessary.

Complete price rigidity is, of course, undesirable. Pricing policies must be responsive to changed economic relationships as they develop in the milk industry. Illustrative of such a change was the sharp decline in milk production during the period 1964 to 1969 and the sharp increase in cheese consumption and decline in nonfat dry milk supplies in 1972. Such changes in economic condition require administrative reaction as soon as the
forces of change become evident. Sensitivity to changed conditions can be improved by the development and employment of better predictive devices and adjustment mechanisms.

Supply-demand adjustors have been used in the past in individual markets to reflect in an ex post fashion changes in economic conditions. The concept of a blend price rising and falling as Class I utilization rises and falls also reflects economic conditions in individual markets as well as nationally. The Minnesota-Wisconsin price series is currently used as the main reflector of economic conditions. It reflects supply-demand conditions in the industry as a whole through the residual manufactured dairy product market. In the short run, price changes may also be needed either nationally or regionally to remedy problems resulting from drought or other natural disaster. Where such changes are made, however, there must be sufficient flexibility to reduce prices when conditions return to normal. Otherwise, long-term stability objectives will be thwarted.

As we move toward a single grade of milk product prices would likely continue to be sensitive to overall longer term milk supply and demand conditions—particularly those products in the lower price classes. If excess supplies of milk developed on a national scale, marked increase in production of products in the lowest price class could be anticipated. The effect would be to drive product prices down to the CCC purchase price. If supplies become great enough eventual lowering of these prices may be required. Similarly, if sharp increases in demand occurred they would first be felt in the lower class price uses as milk is diverted to uses where the greatest demand and highest prices exist.

3. Income - It goes without saying that in order to assure an adequate supply of milk, incomes and return on invested capital must be high enough to provide returns to producers comparable to those available elsewhere. In fact, the long-term existence of an adequate supply of milk itself is evidence that producers are receiving returns on invested capital, labor, and management talents which they regard as reasonable. Similarly, in a market where
production is unrestricted, the willingness of consumers to purchase the supply of milk and milk products at the established price is evidence that the price is not too high from the consumer's standpoint.

Technological change will likely require fewer and larger commercial dairy operations. Continued low income pressure will be exerted on generally smaller and higher cost operations. Such pressures cannot be avoided.

However, the primary problems of low returns to producers result because of national price and production instability. National price and production instability result primarily from cycles of production and technological change. Cycles of production can be minimized by a prudent and economic pricing policy.

4. Coordination with Price Support Program - Two main pricing institutions influence the level of milk prices—Federal orders and the support program. Close coordination between the two is essential if the Secretary is to effectively carry out the prescribed purposes of the legislation. Excessive upward movement of the Class I price, independent of support price change, can result in unneeded supplies of milk which end up in the hands of the Commodity Credit Corporation and result in inequities between the fluid and manufacturing segment of the industry.

Some might argue that as we move toward a single grade of milk the dichotomy between the fluid and manufacturing segments of the industry takes on less significance. This is only partially true. As long as manufacturing grade producers exist in significant numbers, it can be effectively argued that placing primary reliance on changes in Class I prices as a means of raising producer returns results in inequitable treatment of the manufacturing grade producer.

Even if all milk is Grade A and pooled an analogous argument can be made within Federal orders. When all milk is Grade A and pooled, the joint Federal order support price objective could reasonably be interpreted to be one of supporting the price of all milk. In this event, the Secretary could adjust any one of the class prices to assist in achieving this objective. However, if primary emphasis is placed upon Class I prices changes as a means
of increasing producer returns, producers in high utilization markets benefit more than producers in low utilization markets. Coordination between the price support level and the various class prices under milk orders is still required to maintain equitable treatment of producers in different regions and markets.

Other Government programs and policies with respect to agriculture do act as constraint on dairy programs. A degree of competition exists among producers for tax dollars used to support Government programs in agriculture as well as the economy in general. In addition, pricing procedures established in one commodity area frequently set a precedent for similar procedures or principles to be applied to other commodities.

5. **Data Availability and State of the Arts** - In many respects, our sophistication in terms of computer technology and econometric techniques has tended to outdistance the quality of data that is available, and our basic understanding of factors and relationships affecting milk production and consumption decisions. The pervasiveness of such limitations becomes apparent to anyone attempting to develop an economic formula for milk pricing such as those discussed later in the report; or make a decision on the appropriate level of support prices. Much research is needed to improve our understanding of economic factors affecting production and consumption. Data must exist to support such analyses. A cooperative effort of producers, industry, Government, and researchers will be needed to overcome these shortcomings.

6. **Understandable Pricing Concept** - A value must be attached to simplicity, understandability, and intuitive appeal of an administered pricing system. Producers are required, under the Federal order system to approve the order by a two-thirds vote before it can be activated. They cannot be expected to vote for a pricing system which they do not understand. The more complex the system becomes, the more education is required to create such understanding.
IV. ANALYSIS OF ALTERNATIVE PROCEDURES

This section of the report summarizes the results of the Committee's analysis of alternative procedures for changing Federal order prices over time. In doing so, it attempts to evaluate each of the alternative procedures in light of the criteria outlined in the previous chapter. In the Summary and Conclusions we make comparisons among the alternative procedures in terms of how well they meet the established criteria.

Applying the evaluation criteria to the alternative procedures inherently involves a high degree of subjectivity. In a sense all of the criteria are manifest to a degree in the competitive price movement which the Minnesota-Wisconsin series has generated in the past. Yet the Minnesota-Wisconsin series has reflected the imperfections and mistakes made in pricing in the past which in turn at times gave rise to unstable market conditions, substantial surpluses, and subsequent low producer returns. It is a series which is influenced by competitive pressures some of which relate to factors other than supply-demand conditions.

Ideally, what is needed for comparison and validation purposes is a price which would have cleared the market in an equilibrium sense and provided an adequate supply of milk to meet the needs of consumers at reasonable prices. Unfortunately, such a series is not available.

The Committee instead relied on comparisons with the Minnesota-Wisconsin series as well as comparisons among the alternative procedures. In making such comparisons, conclusions were drawn as to how well each of the procedures satisfied the criteria established for evaluation.

The Committee analyzed three basic pricing procedures—economic formulas, product formulas, and hearings.

None of these alternatives are new. To an important extent they have, at one time or another, been utilized as a part of Federal order pricing procedures. They have, however, been utilized on a more limited basis in individual markets or regions. Taking this limitation into consideration, some lessons have been learned from past experience with the alternative procedures. The Committee attempted to capture the essence of these lessons. It then attempted to determine if shortcomings which existed are inherent in the procedure or if, with appropriate modification, they could be overcome.
Economic Formulas

Economic formulas have been used or proposed for use in pricing Class I milk as an attempt to reflect the effects of changes in economic forces on the production and consumption of milk and its products. The effects of changes in the prices of feed, labor, and other inputs purchased by dairy farmers on the milk supply typically have been included in an economic formula. Similarly, the forces affecting consumption, such as income and the prices of other goods and services, have been included. The class of formulas which takes these factors into account directly, rather than indirectly through the prices of manufacturing milk or dairy products, has come to be called economic formulas. This terminology is used here.

Conceptually, two general types of economic formulas could be developed and utilized to move Class I prices in Federal orders. The first and the one which has the greatest appeal to an economist is a supply-demand equilibrium formula. Such a formula would theoretically contain separate production or supply and consumption or demand relationships which when set equal to one another to produce a supply-demand balance would generate the appropriate Federal order prices. The supply relationship could consider the effect of input costs, technological change or increased productivity, and available opportunities for dairy farmers in other agricultural enterprises or in off-farm employment. The demand relationship could either be an aggregation of the demand for individual products or a direct aggregate demand estimate based on factors such as milk prices, consumer income, and substitute availability and prices.

While a supply-demand equilibrium formula has conceptual appeal to economists, its complexity in terms of the ability to develop a meaningful formula has precluded it being seriously suggested as a mover of milk prices. The industry and the Department in a limited number of Federal orders have instead opted for economic index formulas which, in a single relationship or formula, attempt to capture the production and consumption factors which should affect milk prices.

In this section, we discuss the development of economic formulas and experience with them in individual Federal orders in the Northeast and South. Then we discuss three possible economic formulas as movers of national Class I milk prices. These include two economic index formulas and a supply-demand equilibrium formula. An almost infinite variety of formulas could be developed. Therefore, it is apparent that these alternatives do not exhaust the
possibilities. However, the Committee feels that they provide an illustration of the possibilities and limitations of this type of price mover.

Development and Experience with Economic Index Formulas

An economic index formula was put in the Boston order in 1948 and other orders in the Northeast to move Class I prices because of general dissatisfaction with the erratic prices produced by the butter-powder formulas previously used and the feeling in the industry and among producers that such formulas failed to reflect all factors that should be considered in establishing Class I prices. Economic formulas for moving Class I prices were also adopted under the New Orleans and San Antonio orders in 1949 and 1952, respectively.

Following World War II and the termination of special wartime measures such as ceiling prices, subsidies to milk dealers and milk producers, rationing and set-aside orders, prices of manufactured dairy products were highly erratic. These sharp variations in butter and powder prices called for frequent and sizeable changes in Class I prices tied to butter-powder prices. As a result, for every month after November 1946 until the adoption of the economic formula under the Boston order, suspension actions, or other actions, were taken to modify the effect of the butter-powder formula on Class I prices.

The economic formulas for moving Class I prices in the Boston, New York, Philadelphia, New Orleans, and San Antonio markets were intended to reflect (1) general National economic conditions, (2) local supply conditions, and (3) local demand conditions. The common feature of all five formulas was the use of the index of U.S. wholesale prices. All but the San Antonio formula included a provision for automatic price adjustments based on changes in the relationship of producer receipts to Class I sales. Table 1 indicates the factors considered.

The economic index formulas used in the Northeast contained supply-demand adjustors. The committees that developed the Boston and New York formulas concluded that such factors were essential to the successful operation of such formulas.

The experience was that the economic formulas in the Northeast, during periods when nationally supplies were burdensome relative to demand, tended to widen substantially the difference between Class I prices in the Midwest and the Northeast.
Table 1. Weights assigned to various factors in economic index formulas for pricing Class I milk

<table>
<thead>
<tr>
<th>Factors included</th>
<th>Boston Formula</th>
<th>New York Formula</th>
<th>Philadelphia Formula</th>
<th>Economic Index: Formula A</th>
<th>Economic Index: Formula B</th>
</tr>
</thead>
<tbody>
<tr>
<td>General economic conditions:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wholesale price index</td>
<td>0.3333</td>
<td>1.0000</td>
<td>0.2000</td>
<td>0.0833</td>
<td></td>
</tr>
<tr>
<td>Consumer price index</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supply conditions:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ratio of heifers to cows</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Farm wage rates</td>
<td>0.1667</td>
<td></td>
<td></td>
<td>0.0833</td>
<td></td>
</tr>
<tr>
<td>Labor productivity in dairying</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feed cost index</td>
<td>0.1667</td>
<td>2.000</td>
<td>0.0833</td>
<td>0.135</td>
<td></td>
</tr>
<tr>
<td>Price received for all farm products</td>
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<td></td>
<td></td>
<td>0.0833</td>
<td></td>
</tr>
<tr>
<td>Prices paid by farmers</td>
<td></td>
<td></td>
<td></td>
<td>0.0833</td>
<td></td>
</tr>
<tr>
<td>Prices received by farmers for:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>beef cattle</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent unemployed</td>
<td></td>
<td></td>
<td></td>
<td>0.0833</td>
<td></td>
</tr>
<tr>
<td>Demand conditions:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Department store sales</td>
<td>0.3333</td>
<td>1/</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Per capita disposable income</td>
<td>1/</td>
<td></td>
<td></td>
<td>0.0833</td>
<td>0.093</td>
</tr>
<tr>
<td>Class I sales</td>
<td></td>
<td></td>
<td></td>
<td>0.2000</td>
<td>0.129</td>
</tr>
<tr>
<td>Prices paid by condenseries</td>
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<td></td>
<td></td>
<td>0.2000</td>
<td>0.135</td>
</tr>
<tr>
<td>Prices of manufactured dairy products</td>
<td></td>
<td></td>
<td></td>
<td>0.2500 4/</td>
<td>0.135</td>
</tr>
<tr>
<td>Government purchases of dairy products</td>
<td></td>
<td></td>
<td></td>
<td>2/</td>
<td>0.003</td>
</tr>
<tr>
<td>Supply-demand adjustor</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>2/</td>
<td>3/</td>
</tr>
</tbody>
</table>

1/ Per capita disposable income was substituted for department store sales when a regional series became available.

2/ Government purchases of dairy products as percent of U.S. milk production in excess of 6 percent act as a condition which would trigger a hearing.

3/ Incorporated as a formula factor by direct inclusion of Government purchases in formula.

4/ Computed as a composite index of the prices of butter, powder, and cheese.
During the 1940's, prior to the introduction of the economic formula in New York in 1949, the New York Class I price had exceeded the Chicago Class I price in amounts ranging from 23 to 88 cents per hundredweight. With the adoption of the economic formula, the difference widened significantly reaching a peak of $1.96 in 1959.

On the other hand, when the National supply situation tightened up in the mid and late 1960's, the economic formulas were suspended at the request of producers because they failed to keep pace with sharp and continuing increases in manufacturing milk values used to move Class I prices in other markets. A fixed price subject to upward adjustments in the Minnesota-Wisconsin price was substituted. Since 1966, increases or decreases in the Minnesota-Wisconsin price have been directly reflected in the New York-New Jersey Class I price and other Class I prices in the Northeast.

The use of economic formulas in the Northeast created a great deal of unrest among producer leaders in the Midwest during the 1950's and early 1960's because of the growing disparity between prices yielded by their manufacturing-based Class I formulas and the economic formulas in the Northeast.

The New Orleans and San Antonio economic formulas generated price changes which did not move consistently in the same direction nor in the same magnitude as prices in markets where changes in the value of milk used in the production of manufactured products moved Class I prices. The results were Class I prices that were out of alignment with prices in markets from which supplies were readily available on a regular basis.

The San Antonio economic formula was made inactive by an amendment effective February 1, 1954, which "snubbed" the San Antonio Class I price at a maximum of 50 cents over the North Texas Class I price, the approximate cost of moving milk between the two markets. This was necessary to remove a potential advantage that North Texas handlers would have in competing for military milk contracts to supply installations in the San Antonio market. During the last six months of 1952, the San Antonio Class I price exceeded the North Texas price by an average of 31 cents. In 1953, the spread reached a high of $1.24 and averaged $.99. An amendment effective October 1, 1955, replaced the economic formula in the San Antonio order with a manufacturing milk price formula as the mover of the Class I price. The New Orleans economic formula was replaced by a manufacturing milk formula in 1956.
The economic formulas used in the Northeast remained in effect for 17 years and were supported by producers and most handlers in those markets. However, each of the economic formulas used as a mover of Class I prices in individual Federal order markets eventually was discontinued because of problems of price alignment among markets created by the use of different Class I price movers in competing markets.

These intermarket alignment problems would not have been created had the formulas been applied on a National basis. Other problems would, however, have been created. Substantial increases in the price generated by the formula could have provided incentives for National production increases at a time when additional supplies were not needed. In addition, an equity problem would have been created among producers because Federal order milk producers would have benefited from price increases generated by the formulas. Manufacturing grade producers would not have benefited and, in fact, might have been injured by increased production preventing increases in support prices or by downward adjustments in price support levels which might have been required.

National Milk Producers Federation Economic Index Formula Proposal

During 1969, a unified producer proposal for an economic index formula for pricing Class I milk in all Federal order markets was proposed by the National Milk Producers Federation. The formula was to be substituted for the Minnesota-Wisconsin price as the mover of Class I prices.

Following a hearing in early 1970, a recommended decision against adoption of the formula was rendered by the Department primarily because the evidence presented did not establish that the proposed economic formula would, "(1) accurately reflect needed changes in fluid milk prices, (2) maintain appropriate price relationships among markets and uses of milk, (3) be compatible with other program responsibilities of the Secretary." In effect, the Department felt that the NMPF formula divorced the establishment of Class I prices from the rest of the dairy economy to too great an extent.

Vigorous exceptions to the recommended decision were taken by both producers and handlers. The Department's final decision affirmed the findings and conclusions of the recommended decision. With the issuance of the final decision, the Department terminated the proceedings.

1/ 36 F. R. 921
Analysis of Two Economic Index Formulas

The Committee analyzed two economic index formulas to provide additional insight into their usefulness as National movers of milk prices. Economic Index Formula A is a slightly modified version of the formula proposed by the National Milk Producers Federation. This formula was chosen for analysis because it represents the most recent proposal for pricing Class I milk on the basis of economic indicators. The main modifications include the elimination of quarterly pricing, bracketing, and hearing call provisions.

Analysis of Economic Index Formula A - Index Formula A includes 12 factors. These factors and their assigned weights are indicated in Table 1. As proposed the factors were designed to reflect: (1) the ability and willingness of consumers to buy, (2) cost factors in producing milk, (3) alternative opportunities, and (4) manufactured dairy product prices.

For purposes of analyzing the prices generated by the Index Formula A the following assumptions were made: (1) The formula had been adopted in April 1969. (2) The March 1969 price would have been the base price in each market during the April-June 1969 period. (3) The formula values are based on data as of the 25th day of the preceding month. Greater detail on these assumptions is contained in Appendix B.

Monthly changes in Class I prices generated by Formula A would have ranged from +11 to -5 cents. There would have been 34 monthly price increases, 7 decreases and no change in 3 months. The average monthly change would have been 4 cents. The economic formula price would have averaged 23 cents over the Minnesota-Wisconsin price series for the 45 months, April 1969 through December 1972. Over the time period analyzed, this formula resulted in prices which showed a variable but increasingly wide divergence from the prices generated by the Minnesota-Wisconsin price series (Table 2 and Figure 1). By December 1972, this formula would have increased prices 42 cents more from the base period than the Minnesota-Wisconsin price did. A price increase of this magnitude would tend to encourage higher milk production. During much of this period, CCC was making substantial purchases under the price support program.

Analysis of Economic Index Formula B - The number of possible economic index formulas for use in pricing Class I milk is limited only by the ingenuity of the investigator. The Committee developed
Table 2. Comparison of Class I price changes for Minnesota-Wisconsin price \(^1\) with price changes that would have occurred under the Economic Index Formula A

<table>
<thead>
<tr>
<th>Year and Month</th>
<th>Minnesota-Wisconsin prices</th>
<th>Economic Index Formula A prices</th>
<th>Difference from Minnesota-Wisconsin</th>
<th>dollars per cwt.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1969</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>April</td>
<td>4.33</td>
<td>4.33</td>
<td>none</td>
<td></td>
</tr>
<tr>
<td>May</td>
<td>4.34</td>
<td>4.43</td>
<td>+.09</td>
<td></td>
</tr>
<tr>
<td>June</td>
<td>4.37</td>
<td>4.49</td>
<td>+.12</td>
<td></td>
</tr>
<tr>
<td>July</td>
<td>4.39</td>
<td>4.58</td>
<td>+.19</td>
<td></td>
</tr>
<tr>
<td>August</td>
<td>4.41</td>
<td>4.61</td>
<td>+.20</td>
<td></td>
</tr>
<tr>
<td>September</td>
<td>4.42</td>
<td>4.57</td>
<td>+.15</td>
<td></td>
</tr>
<tr>
<td>October</td>
<td>4.49</td>
<td>4.54</td>
<td>+.05</td>
<td></td>
</tr>
<tr>
<td>November</td>
<td>4.58</td>
<td>4.55</td>
<td>-0.03</td>
<td></td>
</tr>
<tr>
<td>December</td>
<td>4.62</td>
<td>4.56</td>
<td>-0.06</td>
<td></td>
</tr>
<tr>
<td>1969 Average</td>
<td>4.44</td>
<td>4.52</td>
<td>+.08</td>
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<td>1970</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>January</td>
<td>4.63</td>
<td>4.61</td>
<td>-0.02</td>
<td></td>
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<td>-0.01</td>
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<td>+.06</td>
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<td>June</td>
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<td>+.23</td>
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<td>+.20</td>
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<tr>
<td>August</td>
<td>4.60</td>
<td>4.82</td>
<td>+.22</td>
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<tr>
<td>September</td>
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<td>4.85</td>
<td>+.24</td>
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<td>4.80</td>
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<td></td>
</tr>
<tr>
<td>November</td>
<td>4.77</td>
<td>4.85</td>
<td>+.08</td>
<td></td>
</tr>
<tr>
<td>December</td>
<td>4.82</td>
<td>4.88</td>
<td>+.06</td>
<td></td>
</tr>
<tr>
<td>1970 Average</td>
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<td>+.12</td>
<td></td>
</tr>
<tr>
<td>1971</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>January</td>
<td>4.83</td>
<td>4.84</td>
<td>+.01</td>
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<tr>
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<td></td>
</tr>
<tr>
<td>March</td>
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<td>4.89</td>
<td>+.06</td>
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<tr>
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<td>4.81</td>
<td>5.00</td>
<td>+.19</td>
<td></td>
</tr>
<tr>
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<td>July</td>
<td>4.76</td>
<td>5.16</td>
<td>+.40</td>
<td></td>
</tr>
<tr>
<td>August</td>
<td>4.77</td>
<td>5.16</td>
<td>+.39</td>
<td></td>
</tr>
<tr>
<td>September</td>
<td>4.77</td>
<td>5.15</td>
<td>+.38</td>
<td></td>
</tr>
<tr>
<td>October</td>
<td>4.83</td>
<td>5.16</td>
<td>+.33</td>
<td></td>
</tr>
<tr>
<td>November</td>
<td>4.82</td>
<td>5.16</td>
<td>+.34</td>
<td></td>
</tr>
<tr>
<td>December</td>
<td>4.84</td>
<td>5.17</td>
<td>+.33</td>
<td></td>
</tr>
<tr>
<td>1971 Average</td>
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<td>5.05</td>
<td>+.25</td>
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</tr>
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<td>1972</td>
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</tr>
<tr>
<td>January</td>
<td>4.93</td>
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<td>+.26</td>
<td></td>
</tr>
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<td>4.94</td>
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<tr>
<td>July</td>
<td>4.95</td>
<td>5.45</td>
<td>+.50</td>
<td></td>
</tr>
<tr>
<td>August</td>
<td>5.01</td>
<td>5.50</td>
<td>+.49</td>
<td></td>
</tr>
<tr>
<td>September</td>
<td>5.07</td>
<td>5.56</td>
<td>+.49</td>
<td></td>
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<tr>
<td>October</td>
<td>5.10</td>
<td>5.58</td>
<td>+.48</td>
<td></td>
</tr>
<tr>
<td>November</td>
<td>5.18</td>
<td>5.64</td>
<td>+.46</td>
<td></td>
</tr>
<tr>
<td>December</td>
<td>5.32</td>
<td>5.74</td>
<td>+.42</td>
<td></td>
</tr>
<tr>
<td>1972 Average</td>
<td>5.04</td>
<td>5.45</td>
<td>+.41</td>
<td></td>
</tr>
<tr>
<td>45 Month Average</td>
<td>4.75</td>
<td>4.98</td>
<td>+.23</td>
<td></td>
</tr>
</tbody>
</table>

\(^1\) Based on movements in the Minnesota-Wisconsin prices for the preceding month.
Figure 1. Prices generated by economic index formula A compared with the Minnesota-Wisconsin price, April 1969–December 1972.
a number of alternative economic index formulas. This was done to further investigate the potential for developing a satisfactory economic index formula and the variation in performance of different formulas. The particular formula was chosen for discussion not because it is either better or worse than any other formula. It is intended merely as an additional illustration.

Economic Index Formula B includes nine factors—many are included in other economic formulas but some are unique to this particular formula. Table 1 lists the factors included in this formula and their assigned weights. Weights were assigned by a statistical procedure. Detail on the structural and statistical aspects of the formula is contained in Appendix C.

The Committee felt that each of the factors included in the formula were important considerations in milk pricing decisions. Factors in the formula affecting the supply of milk included: prices paid by farmers indicating total production cost effects; the ratio of heifers to cows as an indicator of future production; and labor productivity as an indicator of the increase in production that can be expected with no change in labor inputs. Other supply factors reflecting alternative opportunities for dairy farmers were prices received for beef cattle and the unemployment rate reflecting the opportunities for off-farm employment.

Demand conditions are reflected in income and Class I sales. The prices of manufactured dairy products and Government purchases reflect some of the effects of supply and demand conditions in the dairy markets. These factors act as supply-demand adjustors in the formula since they are reflective of the extent of surpluses in the residual market for manufactured products.

Measures of "general economic conditions"—i.e., the wholesale or consumer price indexes—were not included because the intention was to produce a formula relating specifically to the supply and demand conditions for milk. To the extent that changes in the general price level throughout the economy are reflected in the prices paid by farmers, they are reflected in the formula.

Figure 2 indicates the movement of Economic Index Formula B compared with the actual average Federal order Class I price.

Comparisons were made of the prices generated by Economic Index Formula B with the Minnesota-Wisconsin price series and Index Formula A. These comparisons are presented in table 3 in terms of price changes. From the first quarter of 1969 through the
Figure 2. Prices generated by economic index formula B compared with average minimum Federal order Class I prices, 1957–1972.
Table 3. Comparison of price changes generated by Economic Index Formulas A and B with Minnesota-Wisconsin price series changes, quarterly, 1969-1972

<table>
<thead>
<tr>
<th>Year and Quarter</th>
<th>Economic Index</th>
<th>Price Mover</th>
<th>Economic Index</th>
<th>Price Mover</th>
<th>Minnesota-Wisconsin</th>
</tr>
</thead>
<tbody>
<tr>
<td>1969</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>April-June</td>
<td>+.08</td>
<td>+.14</td>
<td>+.02</td>
<td>+.08</td>
<td></td>
</tr>
<tr>
<td>July-Sept.</td>
<td>+.17</td>
<td>+.19</td>
<td>+.06</td>
<td>+.08</td>
<td></td>
</tr>
<tr>
<td>Oct.-Dec.</td>
<td>-.04</td>
<td>+.11</td>
<td>+.16</td>
<td>+.24</td>
<td></td>
</tr>
<tr>
<td>1970</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jan.-Mar.</td>
<td>+.10</td>
<td>-.14</td>
<td>+.08</td>
<td>+.32</td>
<td></td>
</tr>
<tr>
<td>April-June</td>
<td>+.11</td>
<td>+.30</td>
<td>+.04</td>
<td>+.26</td>
<td></td>
</tr>
<tr>
<td>July-Sept.</td>
<td>+.07</td>
<td>+.04</td>
<td>+.02</td>
<td>+.28</td>
<td></td>
</tr>
<tr>
<td>1971</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jan.-Mar.</td>
<td>+.01</td>
<td>-.21</td>
<td>+.07</td>
<td>+.49</td>
<td></td>
</tr>
<tr>
<td>April-June</td>
<td>+.20</td>
<td>+.10</td>
<td>+.45</td>
<td>+.13</td>
<td></td>
</tr>
<tr>
<td>July-Sept.</td>
<td>+.11</td>
<td>+.31</td>
<td>+.23</td>
<td>+.48</td>
<td></td>
</tr>
<tr>
<td>Oct.-Dec.</td>
<td>+.01</td>
<td>+.48</td>
<td>+.06</td>
<td>+.50</td>
<td></td>
</tr>
<tr>
<td>1972</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jan.-Mar.</td>
<td>+.08</td>
<td>-.03</td>
<td>+.13</td>
<td>+.63</td>
<td></td>
</tr>
<tr>
<td>April-June</td>
<td>+.15</td>
<td>+.16</td>
<td>+.02</td>
<td>+.65</td>
<td></td>
</tr>
<tr>
<td>July-Sept.</td>
<td>+.11</td>
<td>+.16</td>
<td>+.03</td>
<td>+.68</td>
<td></td>
</tr>
<tr>
<td>Oct.-Dec.</td>
<td>+.15</td>
<td>+.51</td>
<td>+.19</td>
<td>+.87</td>
<td></td>
</tr>
</tbody>
</table>
fourth quarter of 1972, the Index Formula B would have increased by 1.28 per hundredweight. The last quarter of 1972 accounted for about 40 percent of this change. This compares with an increase of $1.33 for the Index Formula A and $.87 for the Minnesota-Wisconsin price series.

Since 1969, Index Formula B exhibited a higher degree of price variability than either the Minnesota-Wisconsin price series or Index Formula A. This is due to the combined sensitivity of the factors chosen to reflect degrees of pressure on supply and demand and, also, the weighting of those factors. Different factors and different weights demonstrate different degrees of sensitivity and, therefore, greater or lesser price variability.

Analysis of Economic Equilibrium Formulas

Formulas can be developed to directly calculate a price at which the production and consumption of milk and its products would be equal. Such a formula would be developed by setting separate milk supply and demand relationships equal to one another and in the process determining a market clearing price.

The Committee’s analysis indicated that a lot of research needs to be done before a useable model of this type can be developed. On the other hand, such research, if systematically and analytically pursued, probably has the greatest potential for improving the sophistication and performance of our milk pricing system.

A complete supply-demand equilibrium formula would contain separate equations or relationships for each component of milk supply and demand that respond to different economic forces. For example, on the supply side, separate supply relationships would need to be developed for fluid and manufacturing grade milk. An accurate supply relationship should include all the variables that affect the decision to produce milk. At a minimum, they should include the effect of technological developments which increase productivity, the effect of input costs and the effect of alternative farm and off-farm opportunities on milk production. The total demand for milk is the sum of the demand for the products made from milk—primarily fluid milk, cheese, butter, nonfat dry milk, frozen desserts, and cottage cheese. The demand for each of these products is undoubtedly influenced by many factors in different degrees. Ideally, separate demand relationships should be developed for each product with the sum of the individual relationships comprising the total demand for milk.
Economists have not progressed very far in developing such a workable system of supply and demand relationships. This Committee was not very successful at rolling back the frontiers of knowledge either. We present an example of what was done and make the point that much economic research is needed in this area to develop a workable set of relationships.

In the Committee's work, data and time limitations prevented the development of a complete supply-demand equilibrium formula. A single supply relationship was estimated with production, a function of the all milk wholesale price, production per cow, production per man-hour, farm wage rates, price of slaughter cows, and the unemployment rate. Separate equations were estimated for the demand for fluid and manufacturing milk. Fluid milk demand was related to the price paid producers for fluid milk uses, the value of food stamps, per capita disposable income, and the proportion of people under 15 years of age. Manufacturing milk demand was related to prices paid producers for manufacturing grade milk, value of food stamps, per capita disposable income, and Government purchases. Detail on the variables included and statistical aspects of this formula are contained in Appendix D.

The calculations for the equilibrium formula were based on annual data. Therefore, it is not possible to make direct comparisons with the monthly or quarterly prices generated by other economic formulas. The prices generated by this formulation on an annual basis from 1955 to 1971 are shown in figure 3. This particular formulation would generate wider swings in prices and production than either the Index Formulas or the Minnesota-Wisconsin series. Further efforts in development of economic models would be required before such an approach would be directly useable as a price mover.

Evaluation of Economic Formulas as a Price Mover

The Committee concludes that economic formulas have not been developed which can be relied upon as automatic movers of milk prices. This does not mean that economic formulas have no present or future role in milk pricing. Even at this stage in development, economic formulas could be an important input into pricing decisions either with respect to support prices or in Federal order hearings.

The formulas developed by the Committee did exhibit certain virtues which need to be integrated into our pricing system for milk. For example, they were responsive to changes in economic
Figure 3. Prices generated by economic equilibrium formula compared with actual prices for fluid milk, all milk wholesale, and manufacturing grade milk, 1955-1971.
conditions in the milk industry. This responsiveness extended beyond reacting to changes in supply-demand conditions after production has taken place. Economic Index Formula B did exhibit some ability to anticipate or predict turnarounds in production such as that which occurred in 1964 (figure 7). This ability to anticipate was largely related to the inclusion of the ratio of heifers to cows as an indicator of future production.

Index Formula B and the equilibrium formula were automatically responsive to short-term changes in supply conditions relative to market needs. In this responsiveness also lies the root of a problem--the need for price and income stability. One of the early problems the Committee ran into in developing an economic formula is that statistically and economically sound formulas yield prices that are highly sensitive to changes in milk supply and demand. Thus, when milk supplies increase by say one percent, prices fall three to five percent. This should not be surprising. Milk demand and supply are highly inelastic. This means that in an unregulated market, small changes in supply or demand will yield relatively larger changes in price. This precisely is one of the major reasons we have Federal orders and the support price program—to lend price and income stability to the industry.

The question is how much of the price swings generated by such economically and statistically sound formulas can be moderated but yet maintain a relative supply-demand balance. Only one of the formulas analyzed by the Committee (the equilibrium formula) was explicitly formulated to maintain a supply-demand balance. It was also the formula which generated the widest price swings. The Committee questions the extent to which economic index formulas could be relied upon to maintain a supply-demand balance.

Sound formulas could probably be developed to move milk prices if better data were available and our knowledge of the factors bringing about changes in milk production improved. Even if economic formulas were not utilized as automatic movers of milk prices, improvements in information and knowledge of this type are essential to the continued maintenance of an effective administered pricing program.

Economic Formulas with One Grade of Milk

It is apparent that the job of administering milk prices will become more complex as we move toward a single grade of milk and all milk is pooled under Federal orders. A reasonably good job
of pricing has been done in the past, in part, because of the automatic checks provided by the Minnesota-Wisconsin series as a reflector of economic conditions. These automatic checks will not exist when conversion to a single grade of milk occurs.

Economic formulas of the equilibrium type may offer potential as they are improved and developed. Properly constrained, they have the potential for simultaneous consideration of the price changes and levels for each Federal order class. An economic formula can be structured so the size of the differential between various classes is variable and a function of the prices generated by the formula. With greater latitude for refinement of differences among Federal order class prices, greater consideration will need to be given to the economic factors influencing such price differences. This will be a critically important task for economic analysts regardless of whether economic formulas themselves are eventually used in milk pricing.

**Product Price Formulas**

A product price formula is a device for estimating the value of a hundred pounds of milk utilized in a specified dairy product or products. Product formulas utilize product prices, yields per hundredweight, and manufacturing costs in determining the value of milk. For example, in a butter-powder formula, the butter price is multiplied by the number of pounds of butter obtainable from a hundred pounds of milk; and the powder price is multiplied by the number of pounds of powder obtainable from a hundred pounds of milk. The sum of these two multiplications represents the gross return on a hundred pounds of milk manufactured into butter and powder. A manufacturing cost per hundredweight is deducted from this gross return to estimate the value of milk for use in butter and powder. Similar formulas can be developed for other manufacturing uses. Formulas for various uses can be combined to develop a composite product price formula.

Product price formulas, like competitive pay prices such as the Minnesota-Wisconsin price, are a means of measuring the value of milk for manufacturing. When competitive pay prices for manufacturing grade milk become unreliable, a product price formula could be substituted as a mover of Federal order prices.

In this section we will discuss: (1) the difference between competitive pay prices and product price formulas; (2) use of product price formula for Class I pricing; (3) use of product
formulas for surplus pricing; (4) products to include in product price formulas; and (5) information needs and mechanical aspects of product price formulas.

Differences Between Product Price Formulas and Competitive Pay Prices

Competitive pay prices are measures of what plants reportedly pay producers for milk while product price formulas are indicative of what a plant operator can afford to pay producers under given assumptions relating to yields, costs, and product prices. An understanding of the differences between competitive pay prices and product price formulas aids in understanding product price formulas and the likely consequence of using product formulas as price movers. In developing such an understanding the effects of including different combinations of commodities in a formula is an important consideration.

A competitive pay price such as the Minnesota-Wisconsin price is an average of prices paid producers for milk at a group of unregulated milk manufacturing plants. The price is influenced by plant efficiency, prices of and kinds of products manufactured at plants involved, and competition among plants for manufacturing milk supplies. Competition for such supplies is keenest in the surplus areas of Minnesota and Wisconsin. Prices paid in these areas, particularly Wisconsin, are influenced by the large number of plants making cheese. In recent years these plants have been in a strong competitive situation because cheese prices have frequently been high relative to market prices for butter and powder.

Product price formulas as they have been used in the past generally reflect the value of milk in a particular use such as butter-powder, while competitive pay prices generally reflect the value of milk in all manufacturing uses. It is possible to develop a combination butter-powder-cheese formula to reflect the value of milk in these two major uses. Such a composite formula could be modified to include formulas for milk used in other products as well. Little has been done in the development of formulas for products other than butter-powder and cheese. Other uses are relatively less important in terms of amounts of milk utilized and firms have considerably greater discretionary influence on price since markets are more localized in scope and products generally more highly differentiated.

Product price formulas which include multiple uses such as butter-powder and cheese allow for the reflection in raw milk prices of competitive factors related to product prices. Product price
formulas, on the other hand, filter out some of the factors influencing competitive pay prices. Such factors result largely from inter-firm competitive relationships. They include factors such as firm growth strategies, the fixed nature of processing resources, the competitive structure of the market, or extraneous milk marketing and pricing strategies peculiar to particular firms and their managers. For example, if milk supplies are generally short, plant operators may pay more for milk than a product formula would indicate they could afford to pay in order to hold shippers and maintain the volume of milk going to their plants.

Comparison of Product Formulas and Competitive Pay Prices

The products included in a product price formula have a direct effect on the prices generated by the formula. From 1963 to 1972, the Minnesota-Wisconsin price exceeded the butter-powder "snubber" formula used in a number of Federal orders by an average of 6.1 cents. The average absolute difference was 9 cents. At times, differences between the two series were quite large. On a monthly basis, the Minnesota-Wisconsin price ranged from 42 cents above the butter-powder formula in January 1970 to 19 cents below it in May, June, and July 1971 (table 4).

The Minnesota-Wisconsin price exceeds the butter-powder formula during periods of time when cheese prices are high relative to butter-powder. This tendency was particularly pronounced during the last three months of 1969 and the first three months of 1970 when cheese prices were high relative to their normal relationship to butter-powder prices. During this period, the Minnesota-Wisconsin price exceeded the butter-powder formula by amounts ranging from 31 to 42 cents. By May 1970, the Minnesota-Wisconsin price was 7 cents under the butter-powder formula as milk supplies increased and cheese prices dropped to the equivalent of the CCC purchase price. As cheese prices strengthened late in 1970 and early in 1971, the Minnesota-Wisconsin price rose relative to the butter-powder formula.

After the April 1, 1971, price support increase, cheese prices were back at CCC buying price levels and in normal relation with butter-powder. By about May 1971, margins taken by processing plants widened noticeably as milk supplies for processing became plentiful, and for the months of May through November 1971 the Minnesota-Wisconsin price averaged 17 cents less than the butter-powder formula.
By adding a factor representing the value of milk for cheese to a butter-powder formula, it is possible to obtain a broader measure of the value of milk for manufacturing. In addition to providing a broader measure of manufacturing milk values the composite formula is more stable than either a butter-powder formula or a cheese formula (figure 4). A butter-powder-cheese formula was constructed. Estimated quantities of milk used in butter and cheese in Minnesota and Wisconsin were used to weight the butter-powder and cheese components. Make allowances were geared to apparent margins of plant operators making butter-powder and cheese. The apparent margins (one for butter-powder and one for cheese) were calculated by taking the monthly estimated gross return from butter-powder and from cheese, and subtracting the Minnesota-Wisconsin creamery pay price in the case of butter-powder, and the Minnesota-Wisconsin cheese plant pay price in the case of cheese.

Make allowances were updated by using a 24-month moving average of apparent margins (table 5). This minimizes the influence of shorter-term competitive pressures on producer pay prices. Such a make allowance would more closely approximate those that would have been obtained if an audit of the costs of a representative sample of butter-powder and cheese plants had been made. Of course, this moving average of apparent margins procedure could not be used once competitive pay prices disappeared. It is used here as an approximation because an audit of costs was not possible within the time constraints under which the Committee operated.

A comparison of tables 4 and 6 indicates the butter-powder-cheese formula more closely approximates the competitive pay price than does the butter-powder snubber formula. This is due both to putting a cheese factor in the formula and the use of a fixed butter-powder make allowance in the snubber formula.

The annual average of absolute differences between the butter-powder snubber formula and the Minnesota-Wisconsin price ranged from 18 cents to 4 cents for the period 1965-72 with an average of absolute differences for the period of 11 cents. The absolute annual average of differences between the butter-powder-cheese formula with updated make allowances and the Minnesota-Wisconsin price ranged from 9 cents to 2 cents and absolute differences averaged 4 cents during the 1965-72 period.

In order to show the effect of updating make allowances, the butter-powder-cheese formula was also calculated using fixed make allowances. The two formulas, one with a fixed allowance and the other with an updated make allowance, were compared with the Minnesota-Wisconsin price. A comparison of table 7 with table 6 indicates that the use
Figure 4. Prices generated by butter-powder, cheese, and butter-powder-cheese formulas, 1965–1972
Table 4. Amount Minnesota-Wisconsin price exceeds better-powder snubber price, by months, January 1963 to date 1/

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1/ Butter-powder snubber: Chicago 92-score butter price for the month x 4.2; plus, Chicago area spray powder price (26th of preceding month through the 25th of the current month) x0.2; less, 48 cents.
2/ Average ignoring signs.
Table 5. Apparent butter-powder and cheese plant average margins 1/

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1/ 24-month moving averages centered on 24th month of differences between a Minnesota-Wisconsin creamery pay price and the gross value from a butter-powder formula and between a Minnesota-Wisconsin cheese plant pay price and the gross value from a cheese milk formula. Gross value butter-powder is (Chicago 92-score butter price times 4.2) plus (Chicago area spray powder price times 8.2). Gross value cheese is (Wisconsin 40-lb. block cheddar cheese price times 9.45) plus (Chicago 92-score butter price times .3). Minnesota-Wisconsin creamery pay price is pay prices for the individual States weighted by the two-State production of butter for the previous year. Minnesota-Wisconsin cheese plant pays are pay prices for the individual States weighted by the two-State production of American cheese for the previous year.
Table 6. Amount Minnesota-Wisconsin manufacturing grade milk price exceeds butter-powder-cheese formula price 1/

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1/ Butter-powder formula: (Chicago 92-score butter price times 4.2) plus (Chicago area spray powder price times 8.2) minus a manufacturing allowance based on the 24-month moving average, centered on the 24th month, of the difference between a Minnesota-Wisconsin creamery pay price and the gross value of the butter-powder formula. (See table 5 for make allowances used.)

Cheese-milk formula: (Wisconsin primary market, 40-lb. block, cheddar cheese price times 9.45) plus (Chicago 92-score butter price times .3) minus a manufacturing allowance based on the 24-month moving average, centered on the 24th month, of the difference between the Minnesota-Wisconsin cheese plant pay price and the gross value of the cheese-milk formula (See table 5 for make allowances used.)

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2/ Average ignoring signs
Table 7. Amount Minnesota-Wisconsin manufacturing grade price exceeds butter-powder-cheese formula price using fixed make allowance 1/

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1/ Butter-powder formula: (Chicago 92-score butter times 4.2) plus (Chicago area spray powder price times 8.2) minus .48 cents.
   Cheese-milk formula: (Wisconsin 40-lb. block cheddar cheese price times 9.45) plus (Chicago 92-score butter price times .3) minus .57 cents

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2/ Average ignoring signs
of an updated make allowance produces a price that more closely approximates the Minnesota-Wisconsin price. The effect of using the updated allowance becomes increasingly noticeable as time goes on, and the fixed allowance becomes more outdated. For example, in 1972 the formula with the fixed allowance showed an average absolute difference of 11 cents from the Minnesota-Wisconsin price, whereas in 1972 the average of absolute differences of the composite formula with the updated make allowance was 2 cents.

Product Price Formulas as Class I Price Movers

The conceptual question is frequently raised as to the rationale for using a product price formula as a mover of the price of milk used for fluid purposes. The main strength of product price formulas as in the case of competitive pay prices is the sensitivity of product prices to the overall supply-demand balance in the dairy economy. This sensitivity exists because of the residual status of dairy product markets. A condition of relative deficit milk supplies is rapidly reflected in rising product prices. Tying Class I prices directly to product prices allows nearly immediate reflection of this change in the supply-demand balance to producers. Conversely, when excess supplies are generated residual supplies of milk for manufactured products increase and reduce product prices. The effect of increased residual supplies is to automatically reduce prices throughout the dairy economy, discourage further increases in production, and thereby move in the direction of restoring a relative supply-demand balance.

Use of a product price formula provides direct reflection of support price changes into the Class I price. As a protection to producer income, the price support program also provides a floor below which product prices cannot move. The effect is to dampen further significant downward price adjustment once product prices hit the support level. In the meantime, the Secretary can assess the economic situation to determine if the support price, or Class I differentials, should be lowered further to restore a supply-demand balance while fulfilling the other objectives of both programs.

The danger exists that a product price formula based on the supply and demand for individual manufactured products may generate prices which are too responsive and unstable to be directly applied to all class prices and indirectly to blend prices in the same magnitude of price change. The Committee sees a certain amount of merit in this argument. At a minimum, the implication is the choice of a composite mover which represents a broader base of manufactured
products and is less subject to individual commodity price fluctuation but more subject to broader industry changes in supply and demand conditions. Also, it is relevant that a change in a product price formula of a given magnitude represents a smaller percentage change in the price of Class I milk as well as in the blend price to producers.

The use of product price formulas as Class I price movers does not consider certain factors that might otherwise be a desirable part of Class I pricing. For example, product formulas do not attempt to anticipate changes in economic conditions and integrate such changes into the pricing system before they are revealed in increased milk consumption or production. Instead, they respond to changes in economic conditions after they are revealed in product prices. The weight one attaches to this weakness depends on how good a forecasting procedure can be developed and the importance of timeliness in making price adjustments versus the certainty of knowing what supply-demand conditions exist.

Also, product formulas do not provide automatic adjustment to factors which change the elasticity of demand for manufactured or fluid products and thereby may make a change in the price differential between different classes of milk desirable. In product formula pricing this requires consideration of the appropriate size of the Class I differential. The Class I differential in turn determines the extent to which milk used in fluid form carries the burden pricewise of assuring returns needed to produce an adequate supply of milk. In product formula pricing, price differences between classes have traditionally been fixed and changed only by hearings. The alternative of a hearing to consider such factors makes this conceptual weakness of a product formula relatively unimportant in the judgment of the Committee. Economic formulas might also be developed to reflect changes in demand relationships and used as movers of the class differentials.

Experience With and Use of Product Formulas in Pricing Class I Milk

Product price formulas have not been used as a mover of Class I prices to any substantial extent for a number of years. Competitive pay prices were available and provided a direct measure of the average value of milk for all manufacturing uses.

Some of the early milk orders contained formulas under which Class I prices moved up or down with changes in the price of butter. As the
value of nonfat dry milk increased in the early 1940's due to increased wartime demand, butter-powder formulas were developed for use as both Class I price movers and for surplus pricing.

Following the removal of price controls after World War II, prices of manufactured products, particularly butter, showed sharp fluctuations. These variations caused wide fluctuations in the prices yielded by product price formulas and wide fluctuations in Class I prices. It was this situation which led to the adoption, at the request of producers, of economic Class I formulas in the Northeast in the late 1940's. These wide fluctuations in product prices were a short-time phenomenon and, since the advent of the dairy price support program in 1950, manufactured product prices have been generally stable with few exceptions.

The use of product price formulas as a basis for Class I pricing raises the question of whether product prices might be manipulated to influence the level of the Class I price. The Committee is aware of one instance of manipulation where a product price formula was used as the basis of determining Class I prices. In 1946 the New York Class I was based upon a butter-powder formula. A large cooperative bought large quantities of butter on the New York Mercantile Exchange during a 5-day period of December 1946. The purpose of this action was to maintain the level of the New York butter price at a time when the Chicago market was declining rather sharply. Through this action, the cooperative was able to maintain the level of the New York Class I price for the month. A system of bracketed pricing was in effect and if the cooperative had not "supported" the butter market the Class I price would have dropped into a 22-cent lower bracket. The use of bracketing encourages this type of manipulation. Subsequently, the Commodity Exchange Authority took action against the cooperative for manipulating the butter market.

Another apparent instance of a producer organization supporting a product market occurred at several trading sessions on the Wisconsin Cheese Exchange during February 1971. This action temporarily raised the level of the Minnesota-Wisconsin price above what it otherwise would have been. It also temporarily raised the Class I price throughout the country. Trading on the Wisconsin Cheese Exchange is not supervised by the Commodity Exchange Authority. If a product price formula which incorporated cheese prices were used in either Class I or surplus pricing, it would be desirable that the trading on the Wisconsin Cheese Exchange be under the jurisdiction of the Commodity Exchange Authority. This would require an amendment to the Commodity Exchange Act.
For certain markets such as Chicago, product formulas or competitive pay prices when used as Class I price movers have provided an essential ingredient linking Grade A blend prices (through the Class I price) with prices received by Grade B shippers. It is this type of situation where the need for relating Class I prices to manufacturing milk values has been most obvious and the consequences of failure to maintain such relationship most serious. If the Chicago Class I price is too high relative to manufacturing milk values, large quantities of additional milk are attracted to the Chicago pool from the reservoir of milk in Wisconsin.

Evaluation of Product Price Formulas as Class I Price Movers

Product formulas are sensitive indicators of the overall supply-demand balance in the dairy economy. The price support program provides an effective floor below which product price formulas will not move. In this sense, they fail to reflect the development of burdensome surpluses except as these surpluses require downward adjustments in price support levels. In such a situation there is also the option of adjusting Class I differentials downward.

Changes in dairy price support levels and CCC purchase prices are quickly reflected in product price formulas when dairy markets are at, or near, support levels. Product price formulas would provide a high degree of coordination between changes in Class I prices and price support levels and price levels generally for fluid and manufacturing uses. At times, market prices for manufactured dairy products have demonstrated instability and have fluctuated, particularly during periods of short supply. This instability is reflected through all classes of milk when product price formulas are used as price movers. It has been argued that dairy product prices are overly responsive in the short run to changes in supply and demand, and that it is unreasonable and unnecessary to reflect these fluctuations in Class I prices. It has been proposed that through bracketing and less frequent price changes some of this short-time variation could be eliminated. This will be discussed in more detail later.

A product formula, when used as the basis for both the Class I and surplus class prices, allows all producers in all markets to share equally in price increases or decreases. Like competitive pay prices, product formulas, therefore, maintain a more equitable relationship among producer blend prices in markets with sharply different Class I utilization.
Product price formulas have been understandable to most persons familiar with the industry. Like the Minnesota-Wisconsin price, they have been hard to explain to consumers and to many producers in areas remote from the heavy manufacturing areas of the upper Midwest.

Product price formulas would not be as subject to price variation due to competitive conditions among plants in the Minnesota-Wisconsin area as competitive pay prices. Therefore, they would remove this competitive factor from milk pricing.

Problems do exist in data availability and mechanics. The thinness of markets which establish basic butter and cheese values will raise questions as to whether product prices should be used as the basis for moving milk prices throughout the country. Broadening the trading on dairy commodity markets and surveillance of all dairy commodity markets by the Commodity Exchange Authority would help to assure confidence in these markets.

Product Price Formulas as Class I Price Movers When All Milk is Grade A and Pooled

When all milk is Grade A and pooled, an important role would still be expected to exist for product price formulas. Greater administrative discretion as to relative level of class prices will have a major influence on the level of product prices. This indicates a greater need for hearings in determining appropriate price classes and class differentials.

When one grade of milk exists, product prices—particularly those in lower classes—will still be sensitive to supply and demand conditions. They will reflect increases in demand for fluid milk and other products in higher price use classes. When milk supplies increase as demand declines, product markets will feel the impact of residual supplies and lower prices. Product markets will also be subject to changes in demand for manufactured products themselves.

Product Price Formulas in Surplus Pricing

Conversion to a single grade of milk has extensive implications for surplus pricing as it does for Class I pricing. While this Committee was established primarily to analyze alternative means of changing Class I prices, the implications for surplus pricing cannot be ignored. The basic forces requiring a change in pricing procedures are identical. That is, the surplus price is the
Minnesota-Wisconsin price in most Federal order markets. As con-
version to a single grade of milk occurs and the Minnesota-Wisconsin
price becomes either unreliable or nonexistent, another basis for
surplus pricing in Federal orders must also be found.

Principles of Surplus Pricing

One of the objectives of the classified pricing scheme is to estab-
lish prices for milk not needed for fluid use at levels which will
clear the market.

The prices of the so-called "hard" manufactured products (butter,
cheese and nonfat dry milk) are established in a national market
and are strongly influenced by CCC purchase prices which provide an
effective floor. Handlers producing such products have no opportu-
nity to adjust prices at which they sell such products to assure
adequate margins relative to the price for surplus milk established
under a milk order. Therefore, the level of surplus price relative
to the more or less fixed revenues on manufactured products, as
determined by the national market, tends to prescribe the margins
a processor realizes on surplus milk. If all the reserve supplies
of milk not needed for fluid use are to be marketed in an orderly
way and the market cleared, the price for surplus milk must be
closely related to net revenues from the sale of manufactured
products after the deduction of processing costs.

Surplus class prices must track average revenues from manufactured
products. If prices do not correspond closely to the average net
revenues obtained from the sale of manufactured products, misallo-
cations in processing capacity or the utilization of milk may
result. For example, if surplus prices are too low relative to
product prices and costs of processing, unduly wide profit margins
will result. Added manufactured product capacity may be attracted
by such a pricing error. Contrary to both producer and public
interest, adequate supplies of milk may not be readily available
for fluid use and handling charges for fluid use may become
excessive.

As long as unregulated manufacturing plants exist, they tend to be
placed at a competitive disadvantage if Federal order surplus
prices are lower than going prices paid for manufacturing grade
milk. In addition, returns to producers tend to become diluted by
too low a surplus price creating incentives for higher Class I
prices. With the specialization that exists in the handling of
surplus milk, too low a surplus price places those handling the
surplus at an advantage relative to other handlers in the market.
Too high a surplus price relative to product prices creates equally serious consequences. If the surplus price is too high, handlers will generally be less willing to handle surplus milk. This can result in disorderly marketing. It also may mean that cooperatives will be forced to handle the surplus, even if at a loss, if they guarantee a market for the milk of their members. Where cooperatives are forced to handle surplus milk supplies at a loss inequities are created as between members of operating cooperatives who handle the surplus and bargaining associations and nonmembers.

Surplus pricing does not end with the method for establishing prices. There are several basic issues at the heart of the controversy over surplus pricing. These include:

1. Whether the same surplus price should be used in all areas; and, if not, the basis for establishing different levels in different areas.

2. The level of efficiency to which surplus prices should be keyed.

3. The number of surplus classes to establish and which products to include in which class. For example, should a separate price for milk used in butter and powder as opposed to cheese be established?

4. Should there be incorporated in milk orders some type of marketwide service payment for performing the balancing function in a market, or a schedule of charges to handlers on Class I milk for specific services as a means of reimbursement on Class I milk to cover marketing costs and services including surplus balancing?

5. While manufacturing grade milk supplies exists, should plants handling reserve supplies for fluid market be able to obtain milk for manufacturing at levels below the going price for unregulated manufacturing grade milk?

The Committee feels that the following general principles should receive consideration in pricing surplus milk:

1. Surplus prices should promote the utilization of reserve supplies in those products which will provide the highest returns to producers.
2. As long as substantial unregulated manufacturing milk supplies exist, surplus milk should be priced at levels closely related to prices paid at unregulated manufacturing plants.

3. As long as a separate price class for milk processed into butter and powder does not exist, a butter-powder-cheese product price formula is appropriate for use in surplus pricing. The question of whether a separate price class should be established for butter and powder was considered to be sufficiently complex to require analysis in a separate study.

4. A substantial portion of the costs incurred in surplus balancing is part of the fluid milk business. This portion must be viewed as part of the overall cost of supplying handlers with milk for fluid use and should be reflected in charges on Class I milk rather than in the surplus prices.

5. The surplus price should not be used as a device to "bail out" handlers whose costs of handling surplus milk are excessive because of inefficient operations.

Experience with Product Formulas in Surplus Pricing

With few exceptions product formulas used for surplus pricing have been butter-powder formulas. This means to the extent that yield, price, and cost factors have been appropriate, they have reflected the average value of milk used in butter-powder, assuming normal competitive conditions and a given level of efficiency. Such formulas have, when cheese and butter-powder were in normal relationship and normal competitive conditions existed, reflected prices paid for milk, for cheese, and for certain other manufacturing uses, as well. When cheese prices were out of line with butter-powder values, butter-powder formulas have either understated or overstated the value of milk for cheese.

When competition for milk supplies is keen, product formulas historically have tended to understate average prices being paid for manufacturing; and when supplies are plentiful and competition is less keen, they have tended to overstate prices being paid for milk for manufacturing. The elimination of this competitive factor can be viewed as a desirable aspect of product pricing.

It has been difficult to obtain evidence as to appropriate make allowances due to wide cost variation among plants and over time. As a result, there has been a tendency for product price formulas
once adopted to remain in effect for long periods of time without a change in make allowance. The make allowance and other elements of the formula may have reflected competitive pay prices in an area at the time of adoption, but as time went on, new technology and other factors affecting plant operating costs brought about significant changes in costs and the make allowance became obsolete. For example, a butter-powder formula was put into the Chicago order in 1950 which accurately reflected average competitive pay prices in Wisconsin. This formula remained in effect until 1961. In 1960, it averaged 29 cents lower than the midwest condensery price.

For a time, the New York order contained a product formula with a special butter-cheese adjustment applicable during eight months of the year. This formula produced a price in 1960 and early 1961 averaging (for the months the adjustment applied) about 35 cents under competitive pay prices in the Midwest. This situation created a great deal of dissatisfaction on the part of dairy manufacturing plant operators in the Midwest who were paying substantially more for manufacturing milk than New York pool manufacturing plants. Midwest manufacturing interests played an important role at the hearing which was held in the early 1960's on surplus pricing in the New York and other Northeast markets. On the basis of this hearing, relatively low surplus prices in New York were increased and a competitive pay price series was adopted in place of a product price formula.

In recent years a so-called "butter-powder snubber" to the Minnesota-Wisconsin price has been used in a number of orders. This butter-powder formula price is applicable at times when it yields a lower price than the Minnesota-Wisconsin price. The butter-powder snubber was designed to provide some relief in situations when cheese prices were high relative to butter-powder resulting in an abnormally high Minnesota-Wisconsin price in terms of the value of milk for butter-powder.

This means that when the butter-powder snubber is in effect, it has provided a low price for milk for cheese. The "snubber" formula has been in effect for about 10 years with no change in the make allowance. During this period plants have become more efficient. On the other hand, labor, fuel, packaging, and other costs have increased.
Price Support Program and Surplus Pricing

Under the dairy price support program, the Secretary of Agriculture reaches a decision as to the level to support the price of milk and then the purchase prices needed to achieve the announced level of price support.

The price support calculation involves the use of product prices, yields, and a "processing margin" as do butter-powder formulas under Federal milk orders. The yield and make allowance factors used in Federal milk orders differ from those under price support. The question has been raised as to why different USDA agencies should not use the same factors.

Although the butter-powder "snubber" formula was not designed as the basic determinant of surplus price levels, attention has been focussed on the 48-cent make allowance used in the butter-powder snubber and the 67-cent margin used for price support purposes.

The 67-cent margin used in connection with the price support program represents approximately the spread between the average U.S. manufacturing grade milk price in recent years and average gross returns per hundredweight to butter-powder operations during the same period of time, estimated on the basis of market prices for butter and nonfat dry milk and specified yield factors. This margin is related directly to the Department's obligation to support the level of the U.S. average manufacturing grade milk price at between 75 and 90 percent of parity.

The 48-cent make allowance in the "butter-powder snubby" when it was formulated was designed to reflect a level of price approximating the Minnesota-Wisconsin price during periods of time when cheese and butter-powder were in normal relationship with one another. This was consistent with the Federal order policy of gearing surplus prices to the Minnesota-Wisconsin price which represents prices paid in areas where strong competition exists for milk supplies and plants are relatively efficient. Historically, the Minnesota-Wisconsin price has run about 10 cents higher than U.S. average manufacturing milk price.

Since the 67-cent margin under price support is designed to achieve a different price objective (the U.S. average manufacturing level as opposed to the Minnesota-Wisconsin level) it is apparent that a different make allowance is required. A change in either the Federal order or price support objective is required to bring the two make allowances into line. However, when all milk is Grade A and pooled this problem will remedy itself.
There are indications that the 48-cent make allowance in the butter-powder snubber no longer reflects the same relationship to the Minnesota-Wisconsin price that it once did. This was particularly evident in 1971 when the butter-powder snubber consistently exceeded the Minnesota-Wisconsin price. To reflect the Minnesota-Wisconsin level during periods of time when butter and cheese are in normal relationship, some upward adjustment in the 48-cent allowance would be required. This is further indication of the need to constantly and, if possible, automatically update the make allowance in product price formulas.

The yield factors used also influence the margin involved, and margins or processing allowances presently used under the two programs are not strictly comparable for this reason. From the standpoint of yields, there is no reason why the same yield factors should not be used in the price support and Federal order programs. It would be desirable that this be done. Some adjustment in the factors would be required because of the fact that the price support formulation relates to milk of national average fat content (about 3.67 percent), whereas, product price formulas in milk orders relate to milk of 3.5 percent butterfat content.

Products to Include in a Product Price Formula

Competitive pay prices tend to reflect the average value of milk in all manufactured uses. Product price formulas traditionally have been used to reflect the value of milk in a particular use, but, as has been shown, a formula can be designed to reflect average values of milk used in the major uses--butter, powder, and cheese.

The question arises whether a butter-powder formula, a cheese milk formula, or a composite butter-powder-cheese formula is more appropriate to use as a mover for Federal milk order class prices. A further question which arises, if a composite formula is used, is what basis should be used for weighting the butter, powder, and cheese components.

General Consideration--It would be expected that with the development of large diversified manufacturing plants, and the ability of cooperatives and others to divert milk from butter-powder into cheese, that product and producer prices for the two major manufacturing uses would not remain out of line for any length of time. That is, if cheese prices rise relative to butter-powder,
milk would quickly be diverted to the manufacture of cheese and an equilibrium would be promptly reestablished.

Experience in recent years, however, has indicated that cheese prices have remained out of line with butter-powder prices for extended periods of time. Milk has been diverted from butter-powder to cheese in such circumstances but not to the extent needed to promptly restore normal product price relationships.

There are several reasons apparently why cheese prices have tended to remain high relative to butter and powder. The very strong demand for cheese has created a situation where cheese making facilities were strained, at times, to keep pace with demand. This has been so in spite of the fact that cheese manufacturing capacity has been expanded. Secondly, the cheese industry has generally preferred to limit its procurement of cheese to its current and prospective distributive needs. That is, the major cheese assemblers have shown little disposition to continue to receive cheese which is surplus to their own needs for sale to CCC. Rather, they have chosen to put certain suppliers (cheese plants) on quotas or, at times, just discontinued buying from certain plants.

This has created a situation where most of the surplus removed under the price support program has been in for form of butter and powder. Government stocks of butter and powder have hung over those markets and limited the price increases which could occur. On the other hand, small Government purchases of cheese have been committed for program needs as procured and Government stocks for sale back to the trade have been almost nonexistent. In addition, the supply-demand situation for nonfat dry milk was such, until the late fall of 1972, that the nonfat dry milk market has never risen, except fractionally, above the Government purchase price. This obviously was an important factor in the price disparity problem as between butter-powder and cheese.

It can then be argued that during the 1970-72 period butter and powder were the true residual uses for milk. If such is the case, the butter and powder market should be the best reflection of overall industry supply and demand conditions. This argument has a certain amount of merit. On the other hand, the strong influence of the Government's butter and powder stocks tends to retard price advancements for these products at a time when strengthening demand conditions exist in other product markets. While initially there tends to be a lag in responsiveness to changes in demand
conditions, once the slack of Government stocks is taken up, butter-powder formula prices would be expected to be more volatile (less stable) than butter-powder-cheese formula prices.

In addition, there is no assurance that butter and powder will consistently remain the lowest value use for milk. Until 1971, the surplus of solids-not-fat always exceeded the surplus of butterfat. This is no longer the case and the surplus of butterfat is now greater than the surplus of solids-not-fat. Thus, in January of 1973 the Government purchased 21 million pounds of butter at the same time the cheese and nonfat dry milk markets were about 8 cents and 7.5 cents above the CCC buying price, respectively.

This suggests that there are forces at work which will tend to result in less near term disparity between butter-powder and cheese than has existed in the past. The longer term relationship is more difficult to discern.

Class I Pricing—A prime consideration is whether it is more desirable to move Class I prices in response to a broad measure of the value of milk for manufacturing such as butter-powder-cheese; or a measure of the value of milk in its residual use (traditionally butter-powder). The Committee feels that the use of a broad measure such as a butter-powder-cheese formula for Class I pricing has several advantages including: (1) It will reflect overall supply and demand conditions in the industry more accurately than will a narrower measure such as butter-powder where product prices tend to be dominated by the operation of the support program; (2) Criticism has long been made of relating milk prices to changes in the price of butter—a product for which demand is declining. The use of a broader measure helps to meet this criticism; and (3) It will provide greater price stability without sacrificing responsiveness to changing demand conditions in other product markets; and (4) There is no assurance that cheese will continue to generate higher returns than butter-powder.

Surplus Pricing—Three product formulas have been discussed as alternatives to the Minnesota-Wisconsin competitive pay price—a butter-powder formula, a cheese formula, and a composite butter-powder-cheese formula. A related question involves whether a separate price class should be created for butter and powder as opposed to cheese. The limited scope of this study and the complexity of the issues makes only some general observations appropriate.
The Committee feels that there is substantial advantage in basing surplus prices on a composite of manufactured products. We thereby retain in our surplus pricing system substantial incentives for allocating manufacturing resources to products in shortest supply. Such incentives have existed in recent years in the Minnesota-Wisconsin price series by rewarding cheese plants with higher profits than butter-powder plants. The same type of incentive system would exist with a butter-powder-cheese formula.

If a butter-powder formula were used in place of the Minnesota-Wisconsin price as a basis for pricing all surplus milk in the 1970-72 situation even higher profit rewards would exist for cheese plants. However, the margins of butter-powder plants would receive greater protection if surplus milk were sold without service charges or premiums. A more likely eventuality, however, in this situation is the establishment of premiums as cheese plants attempt to bid milk away from butter-powder plants. This would, however, be consistent with a minimum pricing policy for Federal orders with premiums negotiated where they can be obtained.

If a cheese formula were used for pricing all surplus milk, the incentive for butter-powder plants to switch to cheese would likely be largely one of losses on butter-powder operations.

If separate price classes were created in Federal orders for butter-powder and cheese, the incentives for switching between the two products would be substantially reduced. Surplus class prices would be adjusted to reflect product prices and appropriate make allowances. As a result manufacturing profit margins would be relatively constant.

If on the other hand, substantial evidence is accumulated to indicate long-term differences in demand and price relationships between butter-powder and cheese, further consideration of the need to create a separate price class for butter-powder would appear appropriate.

Further study of this issue is needed, however, the Committee's tentative analysis tends to support the use of a butter-powder-cheese formula in surplus pricing. It assumes that the make allowance for such a formula would be based upon reasonably large, efficient plants with continuous operations.

This tentative conclusion does not solve the problem of the balancing operation or the problem of a preponderance of butter-powder or cheese operations in one area relative to another. Nor
does it face up to the problem that in many markets butter-powder, or often just butter, provides the most practical outlet for surplus milk, particularly considering the highly variable volume of milk available for processing. In some markets, the absolute volume as well as the wide-short time variations in supplies of reserve milk are such that cheese does not represent a practical outlet. To relieve at least a portion of this problem, but yet retain incentives for resource allocation consistent with the needs of the market, consideration might be given to weighing the butter-powder and cheese components of a combined formula in a way so as to reflect the relative quantities of milk used in each use in various markets or groups of markets.

Information Needs for Product Price Formulas

We have indicated previously that the basic information needs for a product price formula are: (1) Market prices for products included in the formula; (2) yield information; and (3) manufacturing costs. The critical nature of this information requires further analysis of each.

Product Prices

Product price information can be reported at several levels of trading. These would include the commodity exchange spot market level (for butter and cheese), the wholesale central market level, the assembly point market level, and the f.o.b. plant level.

Product price formulas are intended to reflect the value of milk to processors for milk used in certain products. Therefore, a price that is representative of net prices actually received by processors, f.o.b. plant, for products manufactured would be the most appropriate to use.

The product formulas in Federal milk orders generally use: Chicago wholesale selling prices for butter as reported by the USDA Dairy and Poultry Market News Service; the price for nonfat dry milk f.o.b. plants in the Chicago area (plants in the States of Wisconsin, Minnesota, Iowa, and Michigan are included in the sample) as reported by the Statistical Reporting Service; and prices for Cheddar cheese in barrels at Wisconsin assembling points as reported by the Market News Service.
In the case of butter, wholesale selling prices at Chicago reflect directly and immediately changes in the price of butter as reflected by trading on the spot butter market of the Chicago Mercantile Exchange. The differential over the spot market has been very constant over a long period of time. The level of open-market trading in bulk butter has been at very low levels in recent years and obtaining adequate sales to report a price is often a serious problem. On numerous occasions, market news reporters, because of lack of trading, have reported a nominal price based on the normal differential which prevails between the spot market on the Chicago and New York Mercantile Exchanges and wholesale selling prices.

The trading on the spot butter market of the Mercantile Exchanges also is very thin. However, since the spot butter market at Chicago and New York provide the basis for settlement on purchases and sales of butter throughout the country, the interests of the major buyers and sellers of butter are reflected in the trading. Despite the thinness of the trading, the industry, including cooperatives, generally expresses the opinion that the spot markets provide an important function in adjusting butter values and is generally satisfied with the manner in which butter prices are established. Concern has existed though about the operation of these markets because of thinness of the trading. This concern is tempered, however, by the fact that the butter market has rested at CCC purchase price levels for long periods of time and that most of the time the "market" for butter is the CCC purchase price.

The spot markets of the Chicago and New York Mercantile Exchanges are subject to surveillance by the Commodity Exchange Authority. This provides safeguards against manipulation of the market. Also, from the standpoint of formula pricing, a butter price which reflects changes in the spot market will reflect changes taking place in the value of butter throughout the country.

Suggestions have been made that it might be possible to broaden somewhat the spot butter market if an exchange was established at a point in the heavy production area such as Eau Claire, Wisconsin; and if steps were taken to make it possible for the exchange to serve more of a function as a marketplace. Failure to provide for any assembling allowance on butter sold on the New York and Chicago Mercantile Exchanges all but rules out the use of the spot markets as a marketplace. The rules of the Wisconsin Cheese Exchange deal with this problem by providing an assembly allowance of 1 1/2-1 3/4 cents. This enables sellers to recover assembly costs on cheese sold on the Exchange.
Prices paid for Cheddar cheese in barrels at Wisconsin assembly points as reported by USDA is the measure used in the four cheese formulas used in Federal orders. The volume of transactions involved in the Wisconsin assembly point prices is substantial as compared to the very thin market on which wholesale selling prices for butter are based. Information reported covers open-market transactions of the major assemblers of cheese in Wisconsin. It is estimated that about 200 million pounds of barrel cheese annually are covered by the Wisconsin assembly point price report. This represents virtually all of the open-market trading in barrel cheese at Wisconsin assembly points. A range of prices is reported but no information is reported as to relative volumes sold at different prices.

As in the case of butter, the assembly point price for cheese tends to reflect more or less fixed markups over prices arrived at on the basis of trading on the Wisconsin Cheese Exchange at Green Bay, Wisconsin. Available evidence indicates that the Cheese Exchange performs more of a function as a marketplace than do the butter exchanges and the volume of trading is somewhat greater. However, it is still less than one percent of total Cheddar cheese production in Wisconsin.

The major buyers and sellers of cheese are represented at the weekly trading sessions of the Exchange. The market is thin and the actions of a single trader have, on occasion, appeared to have an undue influence on the price of cheese. The Exchange recently amended its rules with a view to broadening the basis of trading on the Exchange. The Exchange is not a designated commodity market and the trading is not supervised by the Commodity Exchange Authority.

The price measure for nonfat dry milk which is used in nearly all Federal milk orders is the average selling price reported to the Statistical Reporting Service for spray process nonfat dry milk f.o.b. plants located in the Chicago area.

The price for nonfat dry milk has been dominated by the level of the CCC purchase price. During a long period of time, the powder market has rested firmly on the CCC purchase price with few minor exceptions, the most notable of which was during the fall of 1972 and early 1973. The Chicago area spray powder price has usually run fractionally under the CCC buying price.
There is no organized spot market for nonfat dry milk. With the Government purchase price having set the basic level for nonfat dry milk prices for over 20 years there has been little need for such a market in the past.

Information is obtained from plants selling nonfat dry milk as to prices received f.o.b. plant for carlot or trucklot shipments of bulk nonfat dry milk. Information is obtained from plants in Wisconsin, Minnesota, Iowa, and Michigan. About 55 percent of total U.S. production of spray process nonfat dry milk is produced in these four States. Price information is obtained by mail questionnaire from plants and marketing organizations operating in these four States. While there is some variation in the number of plants reporting from month to month, prices are obtained on about 50 percent of the carlot or trucklot sales of nonfat dry milk sold by manufacturers located in the four States.

A number of the plants involved are cooperatives and market their nonfat dry milk through federated marketing organizations. For these plants, the prices represent the original settlement price between the cooperative processor and its federated marketing arm. If the marketing federations have net proceeds at the end of the year as the result of their overall marketing operations, such proceeds may be distributed in the form of an end-of-the-year dividend and in effect represent an additional payment. Nonfat dry milk is not a homogeneous product and differences in characteristics such as high heat, or low heat, affect the price. Considerable quantities of nonfat dry milk are sold on the basis of long-term contracts. This has been the apparent reason why following the announcement of increases in the CCC purchase price of nonfat dry milk the Chicago area spray powder price generally reflects only slightly more than half of the increase in the first month following the increase. Except for the problems mentioned above, the obtaining of a measure of price for nonfat dry milk has not presented serious problems because the market has rested firmly on price support levels. If a point is reached that powder prices frequently move above the CCC purchase price, problems may arise and the problem of lags in the Chicago area price would be more critical.

In conclusion, it has long been recognized that the commodity markets for butter and cheese where base prices are established are thin. Evidence is that prices received for butter and cheese move up or down relative to these base prices. Confidence in the prices being used is essential to a strong product formula pricing procedure. This could be achieved if information as to f.o.b.
plant prices for butter and cheese were obtained on a monthly basis similar to the information presently obtained for nonfat dry milk. This might be appropriately carried on with the cooperation of industry on a voluntary basis. Alternatively, mandatory authority within the Federal order framework may be necessary. Such prices could be used directly in the orders or as a basis of constantly verifying product prices for butter and cheese presently used. In addition to verification, information as to f.o.b. plant prices could be used to establish appropriate adjustments to prices reported at other levels, so as to reflect f.o.b. plant prices. In spite of the potential problems associated with collecting product price information, it is significant that product prices used in product price formulas have not been the subject of controversy. This would indicate they have served reasonably well to reflect changes in product values.

Yields

Obtaining representative information for butter, cheese, and nonfat dry milk yields is a less serious problem. While variation exists among plants, it is possible to obtain relatively good information as to yields.

Manufacturing Costs

One of the most troublesome aspects of developing a product price formula is determining an adequate basis for arriving at a measure of manufacturing cost or make allowance and keeping it up to date. The problem has several dimensions. In the case of plants handling manufacturing grade milk—such as those included in the Minnesota—Wisconsin price series—there is wide variation in plant efficiency. However, costs at plants handling surplus Grade A milk show even a wider range in costs because of sizeable swings in the volume of milk to be processed day to day and seasonally.

For surplus pricing purposes, the make allowance is a critical factor in a product price formula. Experience at Federal order hearings is that evidence is presented which portrays a wide variation in processing costs. Seldom is the evidence of such a nature that it provides a satisfactory basis for incorporating a make allowance in a formula.
The only feasible means of solving the problem of reliable and up-to-date make allowances appears to be one of more extensive and regular analysis of the cost of processing manufactured milk products. An audit procedure under Federal orders would appear to be necessary to the development of product formulas. Detailed procedures for collecting and analyzing such information on a uniform basis would have to be developed.

Costs would be influenced by the size and efficiency of the plants selected from which to obtain cost data. To provide continuous incentive for technological change and efficiency, the emphasis in selecting such a sample should be placed upon reasonably efficient plants which have a continuous supply of milk available to them and are regulated under Federal milk orders.

Product Price Formulas in Surplus Pricing When All Milk is Grade A and Pooled

Considerations involved in pricing surplus milk will be quite different when all milk is Grade A and pooled. The Secretary and/or Congress will be faced with a decision as to the price of milk that is to be supported under the price support program because all, or nearly all, milk will be regulated or pooled.

When all milk is Grade A and pooled the problem of relating surplus prices to prices paid for manufacturing grade milk no longer will be an issue. Likewise, if all milk is pooled, the problem of too low a surplus price attracting milk to fluid milk pools no longer will exist. Class prices could be set so as to encourage maximum consumption at overall price levels needed to assure an adequate supply of milk for the Nation's needs. The base class price levels for milk used in butter-powder and cheese would be a basic determinant of "hard" product prices and would determine the level of Government purchase prices under the price support program. In this situation make allowances and yields for price support and Federal order purposes would be identical.

Product prices would still be expected to reflect overall changes in the supply-demand balance. Product formulas could be used as the basis for pricing surplus milk.

Disparities between prices for milk for various manufacturing uses would not be reflected in returns to producers whose milk was used in particular products because returns from all uses would be pooled. With pooling of returns, price differences among manufacturing uses
would no longer serve to allocate milk supplies where needed. This would indicate the need for developing some mechanism for allocating supplies to various uses in the amounts required.

HEARINGS

A third alternative means of establishing Federal order prices would involve holding a National hearing periodically to consider needed changes in prices. Such a hearing could take on two basic alternative formats: (1) Simultaneous consideration of the level of all class prices and the support price for milk. (2) Consideration of class prices in light of a support price decision which has already been made. In the latter instance, emphasis in the hearing would be placed on appropriate class differentials since surplus class prices would necessarily be closely related to purchase prices established under the support program and related product prices as affected by product market conditions.

Conceptually, the use of the hearing approach would assert that the forces affecting milk supply and demand are so complex and diverse that considering the current state of pricing alternatives it is impossible to rely upon any one mechanistic measure, or formula, to adjust prices. It would also assume that the current procedure of changing Class I prices on a monthly basis is not necessary for the maintenance of an effective Class I pricing system. The subject of how often prices should change will be discussed in greater detail in Part V of this report.

Experience with Hearings in Federal Milk Orders

Federal milk orders are promulgated only after a public hearing has been held. Amendments to the orders can be made only after a hearing. All provisions of the order must be based upon evidence presented at the hearing.

Public hearings have provided a good means of allowing all interested parties to present testimony with respect to market conditions requiring change in the pricing and other provisions of a milk order. Often differences of opinion exist with respect to changes which are needed. Witnesses representing various producer groups and handlers have the opportunity of presenting publicly all available evidence to support their particular point of view. Through the presentation of detailed evidence on different points of view and through a
thorough cross-examination of witnesses, the Secretary has available a substantial factual basis for reaching a decision with respect to needed changes in pricing or other provisions.

An important aspect of the public hearing process is that interested parties have an opportunity to actively participate in shaping terms of a marketing order. Through their participation in hearings, they become more closely identified with the resulting order.

At one time, local hearings were used almost exclusively. However, in the last decade as markets became more interrelated, it became increasingly difficult to deal with pricing and other provisions for a single order in isolation. For this reason more and more regional hearings are being held. National hearings are also becoming more common.

Regional or national hearings provide the basis for obtaining evidence on broad issues that affect a number of different markets. They provide a means of obtaining views from witnesses from a number of markets on how to coordinate order provisions for a group of markets.

National or large regional hearings can become unwieldy because of the potentially large number of witnesses involved. However, the extent of participation may be more limited than at local hearings because of the breadthness of the issues, and because problems which are local in character are handled separately in local hearings. Moreover, the hearing procedure including the issuance of the hearing notice, presentation of testimony, issuing of the recommended and final decision can be time consuming and costly.

There is a tendency, as cooperatives become larger, for positions on certain issues to be resolved through agreement among cooperatives, federations, handlers, and trade associations in advance of hearings. When this occurs, the record may provide less satisfactory and detailed evidence with respect to opposing points of view on issues involved.

In spite of these and other criticisms, the hearing process is considered by most persons affected by the program to be essential. It is an important factor contributing to the success of the program over the years.

Hearings have not been used extensively to directly fix the Federal order Class I prices. Hearings have instead been used to establish in orders a mechanism for pricing such as: product formulas,
Minnesota-Wisconsin series, or economic formulas. They also have been used to adjust the level of the Class I differential.

During the period of Federal milk licenses (1933-37), which preceded Federal milk orders by several years, Class I prices were established after a hearing at a fixed dollars and cents level. This price prevailed until a new fixed price was established on the basis of evidence at another hearing. These fixed prices often contained a specific schedule of seasonal variation.

During the license period, the procedure for holding a hearing and amending an order involved relatively simple administrative procedures. Price changes could be accomplished quickly. This was a period of generally stable prices and the need for price changes was minimized. Under these circumstances, the fixed pricing technique was generally satisfactory.

The Agricultural Marketing Agreement Act of 1937 specified more complex and time-consuming procedures for amending an order. Nevertheless, some of the early Federal milk orders provided for fixed Class I prices. Stepped-up economic activity after the start of World War II ended the relatively stable price situation which had prevailed during much of the 1930's and dairy market trends became more difficult to predict and prices less stable.

Since World War II, product price or economic formulas and the midwest condensery or Minnesota-Wisconsin series have been used almost exclusively as the basis for establishing Class I prices. It has been felt that the administrative actions required to adjust Class I prices on the basis of a hearing would be too time consuming.1/ That is, it has been felt that the time consumed in

1/ The steps normally required in amending a milk order whether it be for purposes of price adjustments or other features are:
(a) Filing of a petition by some interested party stating reasons why amendment is needed.
(b) Invitation by the Department to other interested parties to make additional proposals.
(c) Announcement of time and place of a public hearing.
(d) Conduct of hearing which may require a week or longer.
(e) A time period for filing briefs based on hearing evidence.
(f) Announcement of tentative findings and fixing of time for interested parties to file exceptions.
(g) Announcement of final decisions.
(h) Conduct of producer referendum.
(i) Announcement of results of referendum and effective date of amendment. Unless a finding is made by the Secretary as to the urgency of the amendment the effective date is thirty days after issuance of the amendment.
adjusting Class I prices on the basis of hearings would make it difficult to achieve timely price changes in response to changing economic conditions. The use of pricing formulas provided prompt automatic adjustments of prices to changed economic conditions and reduced the number of hearings required.

In light of this, it is appropriate to examine the following three questions to determine if conditions surrounding the use of a hearing approach to price establishment have changed:

1. Can a hearing be relied upon to generate the type of economic information needed for price establishment?

2. Would annual adjustments in Class I prices on the basis of a hearing provide enough flexibility to changed conditions or are more frequent changes needed?

3. Are there possibilities of combining the formula and annual hearing approach, or other means of achieving a desired degree of price flexibility?

Building a Hearing Record for Purposes of Price Establishment

The legal requirement that provisions of the order be based upon evidence presented at the hearing necessitates the building of a record which contains all of the evidence needed for milk pricing decisions. It is logical that the parties presenting testimony would present evidence which supports their position. Consolidation of cooperative activity has, as indicated previously, resulted in an increasingly unified producer position on changes in order provisions. At times, this unified position has extended to compromises between producers and handlers. The result in this circumstance is that conflicting arguments and points of view can only be brought out by cross-examination of witnesses.

The burden of cross-examination to bring out relevant economic information and views may be particularly heavy in the case of pricing decisions. The bias in the producer sector is generally going to be in the direction of higher prices. Producers and their cooperatives frequently have difficulty taking a public position for either the same or lower prices even though they may be warranted by economic conditions. As long as a significant consumer input does not exist in Federal milk order hearings, the burden would fall on processors and the Department in cross-examination of witnesses for restraint in increasing prices or for price reductions. Over time greater consumer and public interest group participation can be
expected in the hearing process. This has the advantage of providing a wider base for expression of views on milk pricing policy. At the same time, it will likely increase the length and complexity of the hearing process. It may have the effect of subjecting the hearing process to more legal challenges. The effect will likely be to reduce the usefulness of hearings as a direct price establishment tool.

The Nourse Committee and others have suggested that the Department take a more active role as the protagonist for changes in order provisions. This proposal would presumably include the issuance of a preliminary statement of facts and position relevant to the issue and participation by Department witnesses in hearings with an opportunity for cross-examination. The State of California uses a procedure similar to this with apparent success in administering its State milk marketing orders.

Presently, the Government's position, on a proposed change, is stated in the recommended decision following the hearing. While interested parties have the opportunity for filing exceptions, this does not provide for the interchange of points of view which cross-examination at a hearing would.

The Department, generally, has not presented testimony with respect to substantive issues being considered at the hearing and has not submitted proposals for specific order changes (except of an administrative nature). This position has been taken because of the feeling that it is difficult for the Department to, at the same time, serve as an active proponent at a hearing for a specific change and as an impartial judge of the evidence presented. Furthermore, since an order must be approved by producers, the Department must be mindful of the acceptability of any proposed change.

The Committee concludes that if hearings were to be used as a basis for pricing, serious consideration should be given to greater Department involvement in the presentation of facts bearing on its position. Such a presentation might include presentation of data and conclusions as to the current dairy situation and outlook as well as analysis of realistic alternative pricing options. It would provide the Department with an opportunity to recommend a course of action rather than simply accepting or rejecting industry proposals. An economic analysis has been made by the Economic Research Service for ASCS in connection with the 1972-73 and 1973-74 price support decisions. Such an analysis would be equally relevant for Federal order decisions. Exposure to hearings would be beneficial since it would subject the analysis to critique and cross-examination.
Combination of Annual Hearings and Formula Pricing

If a higher degree of Class I price flexibility and responsiveness is desired than is implicit in annual hearings, a combination of a formula (either economic or product price) and the hearing merits consideration. This would provide the additional flexibility that a pricing formula would provide and still provide the opportunity for an annual review at a hearing of the overall supply-demand situation and the performance of the formula. Such a hearing could consider appropriate adjustments in the price level as well as adjustments in the factors and weights utilized in an economic formula or the make allowances of a product price formula used as a Class I or surplus price mover.

Such an annual review would appear to be more appropriate than the establishment of fixed hearing call provisions as an adjunct to an economic or product price formula. The appropriate call provisions are difficult to establish. In periods of rapidly changing conditions they may require repeated hearings even if the pricing procedure is making appropriate adjustment to these conditions. In the event that substantial within-year price or formula changes were required, an emergency hearing could be called. In addition, experience has indicated that call provisions which can be invoked at the discretion of the Secretary, often result in pressure on the Department not to go to a hearing if a price decrease might result.

Evaluation of Annual Hearings as a Means of Establishing Class I Prices

The annual hearing would permit changes in Class I prices to be based on the most complete information available as to all factors affecting the current and prospective milk supply-demand situation. If Class I prices were established once a year, prices would be stable during the year. However, to the extent needed changes during the year were delayed, larger price adjustments would likely be required than if prices were adjusted more frequently.

Prices established once a year would not be responsive to changes during the year. However, it would be possible to hold emergency hearings during the year, if there were strong indications that a change in Class I prices and price support levels was needed. Price support levels have been adjusted upward during the year, on a few occasions, on the basis of strong indication that upward adjustment was needed. If the combination of a pricing formula plus an annual hearing was used, additional responsiveness of prices could be achieved.
One important matter affecting responsiveness relates to political pressures which might be generated if Class I prices were adjusted annually on the basis of a hearing. Downward adjustments in price some times are needed. In the past, formulas have been better suited to achieving needed downward adjustments than have hearings. Political pressures are not limited to the producer sector. As consumers and related pressure groups become more active, the effectiveness of the hearing process as a direct price establishing instrument might also be expected to deteriorate.

The annual hearing could provide for a higher degree of coordination of Class I price levels with the price support program than would formulas. Actions taken as a result of a hearing could be expected to give consideration to the matter of consistency with other Government programs. Pricing formulas because of their nature cannot do this to as great an extent.

The hearing approach if properly modified for participation by USDA would be expected to generate all available information bearing on needed changes in milk prices. Deficiencies in understanding of factors and relationship affecting milk production and consumption, of course, make any decisions less precise than they would be if greater understanding existed. This problem is inherent in any pricing scheme and its solution lies in improved understanding of factors affecting milk prices.

The hearing concept is understandable to most persons. It has been used as a basis for making decisions affecting milk prices for over 30 years.

**Hearings with One Grade of Milk**

Hearings having National scope will likely take on greater significance as we move toward a single grade of milk. Conditions of equity or competition from manufacturing sources which are relevant today in solution of these matters will not be relevant considerations when all milk is Grade A and pooled. Therefore, many of the pricing, classification, and allocation problems confronting the industry will be subject to greater decision discretion. At the same time, the hearing process itself is becoming more complex as demands for input by new interests develop and legal requirements become increasingly stringent.
It is important that steps be taken by industry and Government to improve the effectiveness of the hearing process. An essential aspect of such improvement is increased emphasis on analysis prior to presentation at hearings.
V. THE FREQUENCY OF PRICE CHANGES

Up to this point in the study, little consideration has been given to the question of how often Federal order prices should change. With the exception of the annual hearing procedure, it has been assumed that prices would change on a monthly basis as at present. The hearing procedure, unless combined with a formula, would involve less frequent changes in the Class I price. Proposals have been made to change Class I prices less often than monthly. In addition, there have been proposals to change prices in brackets of from 15 to 23 cents per hundredweight. The issues of how often, and in what magnitude, prices change should not be separated from consideration of an appropriate price mover.

Federal order Class I prices presently move on a monthly basis in response to changes in the Minnesota-Wisconsin price lagged by two months. The Minnesota-Wisconsin price changes frequently. Over the 143 month period January 1961-December 1972, there were 129 monthly price changes. The average price change per month was 3.6 cents per hundredweight. The range in price change was from -16 cents to +23 cents per hundredweight. The price change was 8 cents or less 90 percent of the time. If either a product price formula or economic formula were used on a monthly basis, our analysis indicates approximately the same monthly magnitude and frequency of price variation could be anticipated. Establishing prices quarterly, semiannually, or annually rather than monthly would result in fewer but larger price changes.

Reasoning from a purely economic perspective, two general principles seem appropriate: (1) Prices should change whenever basic economic conditions affecting the production and consumption of milk are substantially altered. (2) Such price changes should be based upon the most recent and reliable information available on the factors affecting milk production and consumption.

Some might suggest that such principles are not necessarily sound in the case of milk because milk production is a long-term phenomenon and producers do not, and cannot, adjust to short-term changes in economic conditions. While not denying the longer term nature of milk production when compared with other farm enterprises such as hogs, broilers, wheat, soybeans, or feed grains; dairymen do make breeding, feeding, culling, and replacement decisions on a continuous basis which affect both the level of milk production and efficiency of their enterprises.
In addition, changes in demand for milk products are frequently sporadic and unpredictable. The increase in demand for fluid milk and cheese during the past year represent cases in point. The fact that price changes in Federal orders were tied to changes in the Minnesota-Wisconsin price series and made on a month-by-month basis allowed continuous and automatic price changes at all class levels in response to these relatively unpredictable changes in economic conditions. It also gave producers nearly immediate benefit in terms of higher prices and revenues. The benefits of using such a responsive pricing procedure as a part of the pricing system, while frequently taken for granted, should not be overlooked.

Saying this does not mean that all prices must change on a monthly basis. The argument for monthly changes in prices is stronger for surplus pricing than for Class I pricing. The more volatile nature of the surplus market as a residual market and the need to relate surplus prices to revenues from manufactured products virtually require that surplus prices change from month to month in response to product price changes.

Arguments favoring less frequent Class I milk price changes relate almost exclusively to the handlers' ability to pass on to the consumer the relatively small price increases which typically occur using a monthly Class I pricing system. The problem becomes particularly pressing during a period of generally rising prices such as have been experienced since the mid-1960's. Small increases in milk prices if they cannot readily be passed on to the wholesale and retail customer continuously cut into already narrow processor margins. The problem is compounded by general increases in other processing costs.

The Department of Agriculture has no specific responsibility under the Agricultural Marketing Agreement Act to protect the margins of handlers. On the other hand, the need for an economically healthy and viable dairy industry cannot be overlooked. Federal order pricing procedures should not overtly contribute to or create economic problems in other sectors of the industry—whether it be handlers or consumers.

However, there are tradeoffs involved. Changing prices less frequently whether it be by quarterly pricing or by bracket pricing results in a less responsive pricing system.

A political and public relations problem also exists. When price changes are lumpy, the relation between Federal order price changes
and retail milk price changes becomes more apparent and may be exaggerated by increases in processor and retailer costs unrelated to the Federal order program. The program itself then becomes more vulnerable and subject to public criticism. On the other hand, processors ask why they should shoulder even part of the blame for price changes initiated under Federal orders.

A potential problem arises in using product price formulas for Class I pricing when bracketing is used. When the magnitude of price changes increases through bracketing or quarterly pricing, increased cooperative incentives to "support" product prices through product purchases or sales result. This is particularly true as the product price approaches a bracket near the end of a pricing period and as the bracket widens.

The solution to this dilemma of opposing arguments and tradeoffs must necessarily be one of balancing. In the balancing process, a reading of the intent and purpose of the Agricultural Marketing Agreement Act invariably raises the question as to whether the solution to the impact of small monthly price changes on handler margins more appropriately lies in wholesale and retail fluid milk pricing procedures in the private or competitive sector than in producer pricing procedures in the public sector.
APPENDIX A. FEATURES OF THE NATIONAL MILK PRODUCERS FEDERATION ECONOMIC FORMULA PROPOSAL

1. A single economic formula would move Class I prices in all Federal order markets.

2. Formula variables selected to reflect: (a) ability and willingness of consumers to buy milk, (b) cost factors in producing milk, (c) alternative farm and nonfarm opportunities for the use of milk production resources, and (d) prices of manufactured dairy products. See Table I for a specific listing of variables included in formula and assigned weights.

3. Price would change upward or downward in increments of 15 cents per hundredweight through a bracketing system of relating prices to the economic index.

An interval between the upper limit of one bracket and the lower limit of the next higher bracket (or the lower limit of one bracket and the upper limit of the next lower bracket) in which the price would remain unchanged and the effective price would reflect the price bracket through which the economic index had most recently passed.

4. Class I prices for quarterly periods beginning on the first day of January, April, July, and October would be based on the economic index for the month preceding the beginning of each quarter. Prices would be announced on the fifth day of the preceding month.

5. A contraseasonal provision that would prevent price decreases on July 1 and October 1.

6. Three conditions would "trigger" a hearing unless the Secretary issued a finding that a hearing was unnecessary:

   a. Purchases of dairy products under the price support program when measured in terms of butterfat during the immediately preceding 12 months exceeded 6 percent of the total U.S. milk production.

   b. The composite index of manufactured dairy product prices departed by more than seven index units from a simple average of the other nine movers included in the economic index during the most recent quarter.
c. The formula had been in effect for 18 months and none of the other hearing calls to review the formula had operated during the most recent 6 months.

7. The base price in each order would be the Class I price in the last month before adoption of the economic formula.

8. In its brief, the Federation proposed that during the first year, the base price should be increased for the first month the formula is in effect by any amount that $4.71 exceeds the Minnesota-Wisconsin price for the previous month, and then for each later month by any amount that the Minnesota-Wisconsin price for the preceding month exceeds $4.71.
APPENDIX B. ASSUMPTIONS MADE IN COMPUTING ECONOMIC INDEX FORMULA A PRICES

The provisions of the Economic Index Formula A are assumed to be those contained in the Department's notice of hearing (34 F.R. 19078) except for modifications proposed and supported as recorded in the Department's recommended decision (35 F.R. 15396) as discussed in Appendix A.

In computing the prices that Formula A would have generated, the following assumptions are made:

1. The formula had been adopted in April 1969.
2. No price changes as a result of hearing calls.
3. If the formula had been adopted on April 1, 1969, the March 1969 Class I price would have been the base price in each market during April-June.
4. The formula index values are based on data as of the 25th day preceding the beginning of each quarterly period. Changing the announcement date from the 25th to the 5th would affect only one factor or 1/12 of the weight involved in the computation of the formula index in all instances, and at most, other factors infrequently.
APPENDIX C. SOME STATISTICAL ASPECTS OF ECONOMIC INDEX FORMULA B

The equation used to obtain the weights for the Economic Index Formula B were of the form

\[ Y = a + b_1 X_1 + b_2 X_2 \ldots + b_n X_n \]

Actual equation

\[
Y = 105.64538 - 0.09828 X_1 - 0.09412 X_2 - 0.09545 X_3 - 0.09193 X_4 \\
(2.16) \quad (2.24) \quad (4.57) \quad (.45) \\
+ 0.06736 X_5 + 0.22980 X_6 - 0.00450 X_7 + 0.04536 X_8 + 0.00238 X_9 \\
(.49) \quad (1.56) \quad (.07) \quad (4.35) \quad (1.30)
\]

all indexes use 1968=100

(t values in parentheses)

where

\[ Y = \text{Index of total milk production} \]
\[ X_1 = \text{Index of composite wholesale prices of butter, cheese, and nonfat dry milk, lagged one year} \]
\[ X_2 = \text{Index of per capita consumption of all fluid products, lagged one year} \]
\[ X_3 = \text{Index of prices for cows for slaughter, lagged one quarter} \]
\[ X_4 = \text{Index of prices paid by farmers for commodities, services, interest, taxes and farm wage rates, lagged one quarter} \]
\[ X_5 = \text{Index of per capita disposable personal income, current dollars, lagged one quarter} \]
\[ X_6 = \text{Index of heifers over 500 pounds per 100 cows, lagged two years} \]
\[ X_7 = \text{Index of hundredweight of milk per man-hour in dairying, lagged one year} \]
\[ X_8 = \text{Index of U.S. unemployment rate from 5.0 percent, lagged one quarter} \]
\( X_9 = \text{Index of Government removals of butter, cheese, and non-fat dry milk for price support purposes} \)

The weights used were derived by summing the regression coefficients without regard to sign and dividing each by the sum to get proportional weighting. The direction of effect was determined intuitively and indexes were inverted as necessary to permit calculation using all positive weights.
APPENDIX D. SOME STATISTICAL ASPECTS OF THE ECONOMIC EQUILIBRIUM FORMULA

Functional relationships were calculated for milk supply, demand for milk for fluid use, and demand for milk for all other uses. Three identities were also included to calculate average milk prices, total milk consumed and the equality of milk production and consumption.

The supply equation was:

\[(1) \quad \text{TMP} = 47348.00 - 2438.57\text{PAM} + 14.25\text{MPC} - 1180.37\text{PMH} + 952.76\text{FWR} \]
\[-1273.21\text{PBC} + 1614.73\text{UER} \]
\[\text{R}^2 = .920; \ F = 19.1; \ D.W. = 2.62 \]
\[(t \text{ values are shown in parentheses below each coefficient)}\]

where \(\text{TMP} = \text{Total milk produced}\)

\(\text{PAM} = \text{Prices paid to producers for all milk wholesale, lagged one year}\)

\(\text{MPC} = \text{Milk production per cow, a proxy for technology}\)

\(\text{PMH} = \text{Index of production per man-hour, a proxy for technology}\)

\(\text{FWR} = \text{Index of farm wage rates, lagged one year, a cost of production variable}\)

\(\text{PBC} = \text{Price of slaughter cows, lagged one year, an alternative use variable}\)

\(\text{UER} = \text{U.S. unemployment rate, lagged one year, an alternative use variable}\)

The demand equation for fluid milk was:

\[(2) \quad \text{TFC} = 8904.50 - 3082.40\text{PFM} - 146.77\text{FSP} + 5.90\text{PYC} + 1580.56\text{PUF} \]
\[(t \text{ values are shown in parentheses below each coefficient)}\]
\[\text{R}^2 = .943; \ F = 49.9; \ D.W. = 1.34 \]

where \(\text{TFC} = \text{Total milk consumed in fluid uses}\)

\(\text{PFM} = \text{Prices paid to producers for milk in all fluid uses}\)
The manufacturing milk demand equation was:

\[
TMC = 89958.76 - 4176.96PMM + 1152.52FSP - 4.85PYC + 11.94GPD
\]

\[
(1.93) \quad (4.89) \quad (2.71) \quad (3.87)
\]

(t values are shown in parentheses below each coefficient)

\[
R^2 = .931; \ F = 40.3; \ D.W. = 1.65
\]

where \(TMC\) = Total milk not used in fluid uses

\(PMM\) = Prices paid to producers for manufacturing grade milk

\(FSP\) = Per capita value of bonus coupons of the Food Stamp Plan, a purchasing power variable

\(PYC\) = Per capita personal disposable income in current dollars, a purchasing power variable

\(GPD\) = Government purchases, deflated by the wholesale price index, a proxy for residual Government demand for milk