An Exploratory Econometric Study of Dairy Bargaining Cooperatives

by George W. Ladd and Milton Hallberg

Department of Economics and Sociology

AGRICULTURAL AND HOME ECONOMICS EXPERIMENT STATION
IOWA STATE UNIVERSITY of Science and Technology

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SUMMARY

Bargaining power can be defined as the degree of influence one party has over another to force concessions or to effect agreements on one's own terms. Such power can be divided into two types. Type I bargaining power refers to the advantages that can be offered to the opponent in return for accepting one's terms. Type II bargaining power refers to the unfavorable consequences that can be forced upon the opponent for refusing to accept the stated terms. The purpose of this study was to determine means available to dairy bargaining cooperatives to obtain bargaining power. Several hypotheses were developed from economic and organization theory and from laboratory experiments on bargaining behavior. A personal-interview survey of 10 dairy bargaining cooperatives in the North Central Region was conducted to obtain information to test these hypotheses.

A ranking of seven objectives by each of nine cooperative managers showed that maintaining a market for members' milk was generally ranked most important, while increasing the size of the procurement area was generally ranked least important.

The four remaining objectives—securing 100-percent control of the milk produced in the procurement area, negotiating for the value of the services provided bottlers, maintaining good relations with bottlers and maintaining the past highest percentage of class I sales—were in general considered more important than increasing the size of the procurement area, but less important than maintaining a market for members' milk.

A regression equation was derived for each of the seven objectives. These equations revealed how the characteristics of the cooperatives and their markets influence the ranking of the seven objectives.

At most, two variables were sufficient to explain at least 85 percent of the variance in the nine rankings of each objective. None of the attributes had a significant effect on the ranking of one objective—increasing the size of the procurement area.

Growth of handlers and handler mergers, large-quantity buying by a single retail unit, and competition from handlers in other markets in response to different federal-order prices and to a desire to expand total market area were considered the major processing developments affecting the bargaining ability of the cooperatives studied.

The results of bargaining between bottlers and dairy cooperatives in nearby markets were also influential on the bargaining ability of the cooperatives studied. All managers interviewed believed they would be in a strong position to negotiate a higher premium if one or more nearby cooperatives had already negotiated a premium or an increase in premium. A successful milk strike by a cooperative in one market may be beneficial to cooperatives in other markets.

The extent to which two or more dairy cooperatives are willing to cooperate with one another in adopting mutually beneficial policies has, in some cases, a significant effect on their bargaining ability. By working together to keep prices in close alignment and by jointly agreeing not to ship milk into another market in which a cooperative is attempting to negotiate a higher price by withholding milk, each cooperative may be able to negotiate higher prices; thus, the members of all cooperatives may benefit.

Adoption of such advantageous and cooperative (in the game theory meaning of the word) strategies, however, seems hindered by (a) each cooperative's fear that neighboring cooperatives will not adopt them, (b) each cooperative's desire to become larger, (c) each cooperative's ignorance of the advantages of such cooperation, or (d) each cooperative's felt need to serve its own members. Such cooperatives may be involved in what game theorists call a prisoners' dilemma game.

Baumol argues that the prisoners' dilemma game is involved in the logic behind governmental control in a democratic society (3). It may be argued that federal milk-marketing orders, cooperative mergers and cooperative federations can be rationalized on the same grounds.

Adoption of cooperative strategies (in the game theory sense) can be assured by a merger, since each cooperative involved in the merger loses its previous identity and falls under the same management. A federation will not necessarily result in the cooperation required. Nevertheless, it does provide an atmosphere in which cooperatives can become more aware of the merits of cooperation. It is for these reasons that dairy cooperative mergers and federations are sought. A merger reduces the number of alternative sources of milk to the cooperatives' handlers and thus contributes to dairy farmers' type II bargaining power. Through closer coordination of the activities of several dairy cooperatives by joint bargaining programs or by various oral agreements among the cooperatives concerned, a federation attempts to do the same.

Most of the cooperatives studied had little trouble in securing recognition from their bargaining opponents. A positive relationship was found between recognition and volume per handler.

All but one of the cooperatives interviewed required members to sign marketing agreements, but only four of these agreements contained breach of contract penalty clauses. Major emphasis was placed on preventing breach of contract through such means as membership meetings, personal contacts with members and the provision of a number of services to members.

The cooperatives studied offer several services to bottlers and, in this way, achieve type I bargaining power. Such services include producer check writing, bulk handling of milk, full-supply contracts, diversion of surplus milk, etc. Governmental regulations may serve as a substitute for a cooperative's type I bargaining power by establishing different minimum prices

to be paid for different use-classes of milk and by providing a seasonal milk-pricing scheme.

A comparison was made between the negotiated prices in each market in which 10 cooperatives studied were located and prices that bottlers in these markets would have had to pay to secure milk from an alternative source. This comparison indicated that the value to bottlers of securing milk from the local cooperative was, in all but one case, greater than each cooperative's estimate of the value of services provided bottlers. A regression analysis revealed that the excess of dealers' buying prices over the sum of price at the alternative source plus transportation cost was, on the average, higher for those cooperatives which (a) placed a higher value on the services they provide bottlers, (b) were located further from the alternative source and (c) were guaranteed, through federal-order regulations, of receiving a price in excess of the price bottlers would have to pay to get milk from the alternative source, by enough to cover the estimated value of services provided bottlers.

The desire of dairy cooperatives to use their type II bargaining power seems negatively related to the percentage of the cooperatives' volume that could be replaced from alternative sources and positively related to the cooperatives' capacity to process milk. Other factors suggested as requiring consideration before a milk strike is called were (a) the number of bottlers from which to withhold milk, (b) the characteristics of these bottlers, (c) the effect of resulting public reaction, if any, (d) whether economic conditions justify the cooperative's demands and (e) whether members will back the strike attempt.

Most of the cooperatives studied were aware of the location of alternative supplies of milk that would replace some or all of their members' milk. They did not, however, indicate a clear notion of what it would cost handlers to secure this milk. With the exception of those cooperatives normally shipping milk to deficit markets, most cooperatives studied listed only the processing facilities of their own or of other cooperatives as alternative outlets for their milk.

Farmers supplying milk to the Chicago and Detroit markets receive large premiums over federal-order prices—much larger premiums than producers in other markets studied receive. Two findings of this study help to explain the existence of these premiums. (a) At recent retail prices for fluid-milk products in Chicago and Detroit, aggregate consumer demand for fluid-milk products is inelastic in these markets, and derived demand facing cooperatives is also inelastic. (b) Bottlers in Chicago and Detroit need the milk of their local cooperatives. This is not true for bottlers in other markets studied. For the other markets studied, there is more than enough surplus grade A milk available from alternative sources to replace the milk of the local cooperative if it withheld milk. Chicago and Detroit are such big markets, bottlers there would find it virtually impossible to satisfy their current levels of consumption from alternative sources if cooperatives serving those two markets withheld their milk.

Most of the cooperatives studied attempted to seek legislation that may substitute for their type I and II bargaining power—e.g., higher federal-order prices or legislation discouraging the use of ungraded milk for fluid milk and fluid-milk products.

An Exploratory Econometric Study of Dairy Bargaining Cooperatives[1]

by George W. Ladd and Milton Hallberg

Farmers are, individually, unable to influence the prices they receive for their products. The firms to which farmers sell their products, on the other hand, are frequently price-setters; i.e., are monopolistic or oligopolistic. Consequently there is widespread belief that the resulting weak market-power position of farmers is one of the principal factors in their farm marketing and income problems. Reflecting this belief is an increasing interest in farmers' bargaining power as a tool to improve farmers' income positions.

Several individual farm commodity groups—most notably in the milk, fruit and vegetable industries—have established bargaining cooperatives. One of the most important of this type of cooperative is the dairy bargaining cooperative. A 1957 survey by the Farmer Cooperative Service of the United States Department of Agriculture indicated that about 207 associations bargained over the price of approximately 1.3 billion dollars worth of milk.[2] A major objective of these organizations is price enhancement through negotiations with processors.

In this manner, such organizations seek to improve the income position of farmers relative to that of nonfarmers. Thus, cooperative bargaining associations are considered a partial solution to the complex farm problem. Grade A milk bargaining cooperatives are the subject of this study.

OBJECTIVES

The purpose of this study was to determine factors influencing bargaining power of grade A milk bargaining cooperatives, to determine their objectives, to investigate various means at their disposal for achieving their objectives and the extent to which these means are utilized in bargaining with fluid milk distributors.

Economists may find the procedures used in this study useful in suggesting ways in which they can study bargaining. The results of this study may also be useful in evaluating and in working out methods of improving the performance of the dairy industry.

This study will provide some of the information needed for a better understanding of the complex bargaining process. The results from this and similar studies may ultimately pave the way for a more realistic model that would provide refutable hypotheses and that could be used to predict the effect of changes in various structural and behavorial variables on the farmers' terms of trade.

CONCEPTS AND MODELS

The focus of attention of research on bargaining power to date has centered largely around questions of (a) the theoretical framework within which generalizations and predictions can be made, (b) the extent to which farmers or labor unions can secure higher prices through the process of collective bargaining and (c) the factors that affect bargaining power. We will consider the first and third. The second is treated in Ladd (18).

Bargaining

Bargaining power may be defined in terms of its component parts: "bargaining" and "power." Power may be defined simply as the influence one has over others. Bargaining is a slightly more complicated concept.

Two things are basic to a bargaining relationship: (a) a conflict of interest between the parties involved and (b) an attempt by each party to resolve the conflict as favorably as possible to himself. Almost every bargaining relationship also involves a community of interest. Fellner (9, p. 15) has pointed out that, in bargaining situations, the behavior of each party depends on the expected reactions of other parties.

Since a conflict of interest is postulated, *bargaining* may be viewed simply as the simultaneous effort by each party to the bargain to win the consent of the other(s). That is, each party is trying to resolve the conflict in a way favorable to himself.

The outcome of the bargaining process depends on how much one or both parties to the bargain can be led to move from some preferred position toward a less preferred position (see 8, p. 81). The degree of influence that one party has over another to force such

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[2] McMillen, Wendell M. Data from cooperative study. (Private communication.) 1963.

concessions or the ability to effect agreements on one's own terms we shall refer to as *bargaining power*. One's bargaining power will be greater the more favorable he can make it for his opponent to accept his offer or the more unfavorable he can make it for his opponent if this opponent refuses to accept and refuses to bargain further (18, p. 14). Chamberlain (8) has also defined bargaining power. One feature common to Chamberlain's definition and to our definition is their relativity. The more favorable one's own terms are to the opponent, the more bargaining power one has. Our preceding definition could be modified to read: Bargaining power is the degree of influence one party has over another to force concessions or the degree of ability to effect agreements on one's own desired terms. A difficulty with this definition is that one's desired terms are subject to variation during bargaining as one's aspiration level is affected (10, 27).

There are two different types of bargaining power. The first stems from advantages that can be offered to the opponent in return for accepting one's terms. Such advantages may be in the form of savings that can be offered the opponent or extra services that can be provided. This kind of bargaining power is called type I or "opponent-gain" power.

The second type of bargaining power—type II or "opponent-pain" power—consists of the bargainer's ability to enforce unfavorable consequences upon the opponent if he refuses to accept the stated terms. To exercise this type of bargaining power, the bargainer must be able to subject the opponent to some added costs or losses for refusal to accept his terms. The higher the costs or the larger the losses that can be imposed on an opponent, the greater is one's bargaining power.

Bargaining outcome is conditioned by the bargaining strategy used during the bargaining process. The elements of one's bargaining strategy have been outlined by Stevens (29, pp. 57-96).

A. Information giving and seeking tactics: 1) representing one's own preferences—the satisfactions one associates with various outcomes of the negotiations, 2) attempts to discover the opponent's preferences.

B. Persuasion: 1) attempts to alter the opponent's preferences, 2) attempts to influence the opponent's expectations about one's own negotiation or extra-negotiation environment.

C. Coercion: 1) attempts to influence the opponent's expectations about one's intended course of action, including one's accurate representation, misrepresentation, and/or concealing of his own preferences, 2) attempts to influence the preferences and courses of action of "third parties" who may affect the outcome of the negotiations.

The outcome of bargaining is dependent upon the bargaining power and strategy of the individual bargainers. The individual's bargaining strategy will be conditioned by his bargaining power. The bargaining outcome will in some cases affect one's bargaining power. Hence, bargaining power, strategy and outcome may be interdependent; if so, a study of the bargaining process must focus on this interdependency as well as on the exogenous variables affecting each factor.

Models

Hicks (13), Zeuthen (35) and Pen (22) have presented theories of bargaining that offer insights into agricultural bargaining processes. Theories of bilaterally restricted competition—bilateral monopoly, bilateral duopoly, and the like—are also helpful in understanding bargaining. These theories are summarized in Fellner (9) and Siegel and Fouraker (27). Game theory also suggests relevant concepts and hypotheses. Reviews of game theory are provided by Bishop (4) and Luce and Raiffa (19). Unfortunately, none of these theories is sufficiently well developed to provide a basis for predicting the outcome of specific bargaining situations.

A cooperative is a firm amenable to economic analysis. Phillips (23) and Robotka (24) have discussed economic theory of cooperatives. A cooperative is also an organization. Therefore, concepts and analyses from organization theory are relevant to a study of bargaining cooperatives. Papandreau (21), March and Simon (20, 28) and Barnard (2) are useful references. A cooperative is a vertical extension of a group of independent firms. Its goals and behavior are affected by group decisions and group support. Knowledge of group dynamics (7) and social interaction within a group (14) is therefore helpful to a complete understanding of cooperative behavior. The relevance of the various disciplines mentioned in this paragraph to agricultural bargaining cooperatives is discussed at length in Ladd (18) and in Hallberg (11).

These analytical techniques usually ignore the presence of government or assume passive government. Such an assumption is inappropriate to a study of grade A milk bargaining cooperatives. Most of the grade A milk marketed in this country is purchased by bottlers subject to the provisions of federal milk-marketing orders.[3] The operation of federal milk-marketing orders is discussed in (30). Some states possess milk-control laws, but none of the north-central states do. Most states and large cities also have sanitary requirements which farmers must satisfy to be eligible to sell milk for fluid use. These requirements can restrict the flow of milk into a market. The ways in which legislation can affect the bargaining power of a cooperative are discussed in Ladd (18) and in Hallberg (11).

Prisoners' dilemma game

One game encountered in game theory seems especially relevant to a study of bargaining cooperatives, especially to relations between cooperatives and between members and nonmembers. This is the prisoners' dilemma game. An example of a payoff matrix for such

[3] In this report, the terms bottler and handler are used interchangeably to denote a firm producing bottled or cartoned fluid milk and cream products from farm-produced milk and cream.

Table 1. Prisoners' dilemma game payoff matrix.

Player A	Player B: Cooperative strategy	Player B: Noncooperative strategy
Cooperative strategy	(5, 5)	(–4, 6)
Noncooperative strategy	(6,–4)	(–3,–3)

a game is in table 1. The figures in parentheses represent payoffs to the two players. If player A selects his cooperative strategy and player B selects his noncooperative strategy, A receives –4, and B receives 6. The terms cooperative and noncooperative are used here in the game theory meaning. Each player's cooperative strategy requires some act on his part to cooperate with his opponent.

This is a noncooperative game; there is no provision for collusion, communication or side payments from one player to the other after each play of the game. The sum of the payoffs to the two players is greatest if each selects his cooperative strategy and least if each adopts his noncooperative strategy. But each player has a strong incentive to adopt his noncooperative strategy. Given the strategy of the opponent, each player can increase his winnings by selecting his own noncooperative strategy. Theoretical evidence and experimental evidence show that both players select their noncooperative strategies in such games.

If provision for side payments or collusion were made and enforced, this would not be a prisoners' dilemma game. Then each player would have an incentive to adopt his cooperative strategy.

There are pressures that encourage some cooperatives to adopt noncooperative or retaliatory strategies. If every cooperative involved can be better off if all adopt cooperative strategies, the cooperatives may be involved in a prisoners' dilemma game. Each player knows he will be better off if all choose a cooperative strategy; however, no player sees anything to be gained by adopting a cooperative strategy unless there is a guarantee that each will adopt a cooperative strategy.

In games of this nature, cooperation may be achieved —if outside forces encourage it. Baumol, for example, argues that the prisoners' dilemma game is involved in the logic behind governmental control in a democratic society. That is, anti-inflationary measures, rationing, conscription, etc., ". . . are designed, at least in part, to achieve the cooperation which alone can prevent the loss to each player from his trying to protect himself when he has no assurance that others will behave as required for their mutual interest" (3, p. 362).

The relevance of the prisoners' dilemma game to bargaining cooperatives will be discussed in the subsections entitled, "Influence of Nearby Markets" and "Mergers and Federations."

Price discrimination

Federal milk-marketing orders provide for pricing milk at the farm level according to the use made of the milk. Higher prices are paid for milk going into fluid-milk (bottled milk and cream, half-and-half, coffee cream, etc.) products for which demand is less price elastic. Lower prices are paid for milk used in other products for which demand is more price elastic.

The price-discrimination model of revenue maximization relevant to a pure-bargaining grade A cooperative which does not restrict supply can be formulated as follows. Let

P_1 = price received by the cooperative for milk used in fluid milk products

P_2 = price received by the cooperative for other milk

X_1 = quantity of fluid milk sold

X_2 = quantity of surplus milk sold

$X = X_1 + X_2$

X_0 = fixed quantity of milk which the cooperative must market

$C(X) = Xg(X)$ = cooperative's aggregate total cost function for X

$P_1 = f_1(X_1)$ = milk dealer's demand function for X_1

$R_1(X_1) = X_1f_1(X_1)$ = milk dealer's total expenditure function for X_1

$P_2 = f_2(X_2)$ = milk dealer's demand function for X_2

$R_2(X_2) = X_2f_2(X_2)$ = milk dealer's total expenditure function for X_2

(1) $\pi = R_1(X_1) + R_2(X_2) - C(X)$ = net revenue

But we have a restriction on the profit equation—the total quantity of milk produced by cooperative members must be sold; i.e., $X_0 = X_1 + X_2$. Thus, the equation to be maximized is

(2) $\pi^0 = R_1(X_1) + R_2(X_2) - C(X) - \lambda(X_0 - X_1 - X_2)$

where λ is a Lagrangian multiplier. The first-order conditions that π be a maximum are:

(3) $\partial\pi^0/\partial X_1 = R_1'(X_1) - C'(X) + \lambda = f_1(X_1) + X_1f_1'(X_1) - g(X) - Xg'(X) + \lambda = 0$

(4) $\partial\pi^0/\partial X_2 = R_2'(X_2) - C'(X) + \lambda = f_2(X_2) + X_2f_2'(X_2) - g(X) - Xg'(X) + \lambda = 0$

(5) $\partial\pi^0/\partial\lambda = X_0 - X_1 - X_2 = 0$,

and the second-order condition is that the sum of the slopes of the marginal revenue curves be negative; i.e., $R_1''(X_1) + R_2''(X_2) < 0$. The number of primes indicates the order of the differentiation.

On taking the total differential of equation 1 with respect to X_1 and X_2, and substituting $\partial\pi/\partial X_1 = \partial\pi/\partial X_2 = -\lambda$ from equations 3 and 4 and substituting $dX_1 + dX_2 = dX_0$ from equation 5, we find $d\pi/dX_0 = -\lambda$, the shadow price of additional milk. Further, on solving equations 3 to 5 simultaneously for the unknowns X_1, X_2 and λ in terms of the average revenue and cost functions and their slopes, we have:

$$(6)\quad X_1 = [f_2(X_2) - f_1(X_1) + X_0 f_2'(X_2)]\phi$$

$$(7)\quad X_2 = [f_1(X_1) - f_2(X_2) + X_0 f_1'(X_1)]\phi$$

$$(8)\quad \lambda = g(X) + X_0 g'(X) - [f_1(X_1) f_2'(X_2) + f_2(X_2) f_1'(X_1) + f_1'(X_1) f_2'(X_2) X_0]\phi$$

where

$$\phi = [f_1'(X_1) + f_2'(X_2)]^{-1}.$$

Since $d\pi/dX_0 = -\lambda$, if $\lambda < 0$, increasing X_0 will increase π, while if $\lambda > 0$, increasing X_0 will decrease π.

Solving equations 3 and 4 simultaneously in terms of $R_1'(X_1)$ and $R_2'(X_2)$, we find that the marginal revenue for X_1 and X_2 must be equal—the same result as for the unconstrained case.

Further, since $f_1'(X_1)$ and $f_2'(X_2)$ will normally be negative and since $f_1(X_1)$, $f_2(X_2)$, X_1 and X_2 must be nonnegative to be economically meaningful, the condition,

$$(9)\quad -X_0 f_1'(X_1) \geqq [f_1(X_1) - f_2(X_2)] \geqq X_0 f_2'(X_2),$$

must also be fulfilled. This condition is derived from equations 6 and 7 by specifying $X_1 \geqq 0$ and $X_2 \geqq 0$. This condition states that, for example, if the monopolists' average revenue from X_2 (i.e., $f_2(X_2)$) is quite low compared with that from X_1 so that the quantity within the brackets of equation 9 exceeds $-X_0 f_1'(X_1)$, X_2 will be negative. Hence, in our case, if nonnegative outputs are to be attained and the usual case of downward sloping demand functions and positive prices prevails, price discrimination will be possible if and only if the elasticities of demand in the two markets are unequal *and* equation 9 is fulfilled.

Similar but more complicated results can be derived for the case where total output is not constrained. To our knowledge, a condition similar to 9 has not been rigorously treated in the literature on price discrimination. Rather, it is simply assumed that the profit-maximization solution will yield positive outputs and prices, and this assumption is, in general, not even made explicit. Harris (12, p. 52), however, has worked out several examples which indicate that profitable price discrimination is not always possible even if demand elasticities are unequal in the two markets.

The values of X_1 and X_2 which maximize π subject to the restriction $X_0 = X_1 + X_2$ also maximize π/X_0; that is, solving the preceding problem is equivalent to maximizing π/X_0.

This model will be used in the section entitled "Type I Bargaining Power."

Federal-order provisions

Most of the 82 federal milk-market orders in effect have established only two use-classifications for milk: (a) class I milk which generally includes bottled products such as whole milk, flavored milk drinks, buttermilk, concentrated milk and sweet and sour cream and (b) class II milk which includes all other milk products. The order then requires the establishment of minimum prices for each use-class.

The accepted standard for establishing class I prices is that price which equates supply and demand in the market area. Two types of formulas have been developed to establish and maintain such prices. The "economic formulas" relate fluid milk prices to selected economic factors (price and available supply of feed, per-capita disposable income, changes in the general level of wholesale prices, etc.), while the "manufacturing milk formulas" relate the price of class I milk to market prices of manufactured dairy products or the value of milk used for such purposes. Specified differentials are added to manufacturing values to account for the additional cost of producing milk inspected for fluid use and other special economic conditions that influence the price of milk in city markets.

Several orders provide for the operation of an automatic "supply-demand adjuster." The supply-demand adjuster is designed to correct prices for maladjustments in supply and demand in the local market. This device increases class I price when supplies of milk relative to class I sales are less than the "normal" or "standard" relationship of class I sales to supply. Prices for class II milk are determined by formulas based on manufactured dairy products prices or on prices paid for milk by unregulated manufacturing plants.

After the minimum class prices to be paid by bottlers are established, the prices to farmers are computed. In a market-wide pool, the total money value of all milk delivered to regulated bottlers by farmers is combined into one pool. Butterfat and producer location differential adjustments are computed. The blend price is computed by dividing the value of this pool by the quantity of milk priced under the order. Each milk producer receives this blend price, minus his butterfat and location differential. In an individual-handler pool, a blend price is computed for each bottler separately by dividing the total value of all milk delivered to the bottler by the quantity of milk delivered to the bottler. Each producer receives the blend price computed for his bottler minus butterfat and location differential.

Many orders also contain one of three seasonal pricing provisions: seasonal class I price differential, base-excess plan or Louisville (take-out-pay-back) plan. See (30) for a fuller discussion of federal-order provisions.

Babb (1) and others (34) have used multiple regression to study intermarket blend price and class I price relationships for federal-order markets. Their dependent variable was market price; the independent variables were distance of the market from Eau Claire, Wisconsin, and class I utilization in the market. They did not consider the possibility that price in each market may be related to the types of provisions in the federal-order in that market. To study the relation between federal-order provisions and blend prices, we used the variables

D_{i11} = 1 if market i has seasonal class differential,
= 0 otherwise;

D_{i12} = 1 if market i has a base-excess plan,
= 0 otherwise;

D_{i13} = 1 if market i has the Louisville plan,
= 0 otherwise;

D_{i14} = 1 if market i has no seasonal incentive plan,
= 0 otherwise;

D_{i21} = 1 if market i has an individual-handler pool,
= 0 otherwise;

D_{i22} = 1 if market i has a market-wide pool,
= 0 otherwise;

D_{i31} = 1 if market i has an economic-type basic price formula,
= 0 otherwise;

D_{i32} = 1 if market i has a manufacturing-type basic price formula,
= 0 otherwise;

D_{i41} = 1 if market i has a supply-demand adjuster,
= 0 otherwise;

D_{i42} = 1 if market i has no supply-demand adjuster,
= 0 otherwise;

Y_i = average annual 1963 blend price in market i in cents per hundredweight (31);

D_{1i} = 1 for all markets,

X_{1i} = distance from Eau Claire to market i (miles);

X_{2i} = average annual 1963 class I utilization percentage (31);

ϵ_i = normally and independently distributed random variable with mean 0 and variance σ^2;

i = 1, 2, ..., 82 (the number of federal-order markets in 1963 being 82).

The coefficients in the equation,

$$(10)\quad Y_i = \alpha_0 D_1 + \alpha_{11}D_{i11} + \alpha_{12}D_{i12} + \alpha_{14}D_{i14} + \alpha_{22}D_{i22} + \alpha_{32}D_{i32} + \alpha_{41}D_{i41} + (\beta_0 D_1 + \beta_{11}D_{i11} + \beta_{12}D_{i12} + \beta_{13}D_{i13} + \beta_{21}D_{i21} + \beta_{31}D_{i31} + \beta_{41}D_{i41})X_{1i} + (\gamma_0 D_1 + \gamma_{11}D_{i11} + \gamma_{12}D_{i12} + \gamma_{13}D_{i13} + \gamma_{21}D_{i21} + \gamma_{31}D_{i31} + \gamma_{41}D_{i41})X_{2i} + \epsilon_i,$$

can be used to study the effects of mileage, utilization and order provisions. High intercorrelations among some of the independent variables necessitated the estimation of simpler equations. After eliminating variables with high intercorrelations — D_1, D_{i11}, D_{i12}, D_{i41}, $D_{i12}X_{1i}$, $D_{i13}X_{1i}$, $D_{i21}X_{1i}$ and $D_{i31}X_{1i}$ — the results in table 2 were obtained.

There are 32 classes of federal-order markets. Regression equation 10 can be written

$$(11)\quad Y_{ij} = \alpha_j + \beta_j X_{1ij} + \gamma_j X_{2ij} + \epsilon_{ij}$$

Y_{ij} = price in i-th market in j-th class
j = 1, 2, ..., 32,

X_{1ij} = distance of i-th market in j-th class from Eau Claire,

X_{2ij} = percentage of class I utilization in i-th market in j-th class,

α_j = intercept for markets in j-th class of market,

β_j = effect of distance from Eau Claire on blend price in j-th class,

γ_j = effect of class I utilization on blend price in j-th class.

Table 2. Results of blend price regression analysis for 1963.[a]

Coefficient	Estimate
α_{14}	−173.75*
α_{22}	108.64***
α_{32}	95.85**
β_0	0.04576***
β_{11}	0.04955***
β_{41}	0.03792***
γ_0	5.042***
γ_{11}	−2.823**
γ_{12}	−2.398**
γ_{13}	−2.537**
γ_{21}	1.237***
γ_{31}	1.852***
γ_{41}	−0.466***
R^2	0.9985

[a] A single asterisk, *, indicates significance at the 10-percent level; **, the 5-percent level; ***, the 1-percent level.

Table 3 presents estimates of α_j, β_j and γ_j derived from the coefficients in table 2 for each class of market. Denote these estimates by a_j, b_j and c_j. (Throughout this report a_j, b_j and c_j denote estimates of α_j, β_j and γ_j.) The indexes s, t, u, v are defined as:

$$\begin{aligned} s &= 1 \text{ if } D_{i11} = 1 \\ &= 2 \text{ if } D_{i12} = 1 \\ &= 3 \text{ if } D_{i13} = 1 \\ &= 4 \text{ if } D_{i14} = 1 \\ t &= 1 \text{ if } D_{i21} = 1 \\ &= 2 \text{ if } D_{i22} = 1 \\ u &= 1 \text{ if } D_{i31} = 1 \\ &= 2 \text{ if } D_{i32} = 1 \\ v &= 1 \text{ if } D_{i41} = 1 \\ &= 2 \text{ if } D_{i42} = 1 . \end{aligned}$$

Thus, the first row in table 3 presents coefficients for markets with a seasonal class price differential, individual-handler pool, economic type basic price formula and a supply-demand adjuster.

Some patterns can be found in these coefficients. If the pool plan, basic price formula and supply-demand adjuster provisions are fixed,

$$\begin{aligned} a_{1tuv} &= a_{2tuv} = a_{3tuv} > a_{4tuv} \\ b_{1tuv} &> b_{2tuv} = b_{3tuv} = b_{4tuv} \\ c_{1tuv} &< c_{3tuv} < c_{2tuv} < c_{4tuv} . \end{aligned}$$

Table 3. Coefficients for estimating blend price in various classes of federal-order markets.

Class (j)	Seasonal incentive plan (s)	Pool plan (t)	Basic price formula (u)	Supply-demand adjuster (v)	Estimates of parameters a_j	b_j	c_j
1	1	1	1	1	0	0.13323	4.8413
2	1	1	1	2	0	0.09531	5.3077
3	1	1	2	1	95.85	0.13323	2.9892
4	1	1	2	2	95.85	0.09531	3.4556
5	1	2	1	1	108.64	0.13323	3.6046
6	1	2	1	2	108.64	0.09531	4.0710
7	1	2	2	1	204.49	0.13323	1.7525
8	1	2	2	2	204.49	0.09531	2.2189
9	2	1	1	1	0	0.08368	5.2663
10	2	1	1	2	0	0.04576	5.7327
11	2	1	2	1	95.85	0.08368	3.4142
12	2	1	2	2	95.85	0.04576	3.8806
13	2	2	1	1	108.64	0.08368	4.0296
14	2	2	1	2	108.64	0.04576	4.4960
15	2	2	2	1	204.49	0.08368	2.1775
16	2	2	2	2	204.49	0.04576	2.6439
17	3	1	1	1	0	0.08368	5.1270
18	3	1	1	2	0	0.04576	5.5934
19	3	1	2	1	95.85	0.08368	3.2749
20	3	1	2	2	95.85	0.04576	3.7413
21	3	2	1	1	108.64	0.08368	3.8903
22	3	2	1	2	108.64	0.04576	4.3567
23	3	2	2	1	204.49	0.08368	2.0382
24	3	2	2	2	204.49	0.04576	2.5046
25	4	1	1	1	−173.75	0.08368	7.6643
26	4	1	1	2	−173.75	0.04576	8.1307
27	4	1	2	1	−77.90	0.08368	5.8122
28	4	1	2	2	−77.90	0.04576	6.2786
29	4	2	1	1	−65.11	0.08368	6.4276
30	4	2	1	2	−65.11	0.04576	6.8940
31	4	2	2	1	30.74	0.08368	4.5755
32	4	2	2	2	30.74	0.04576	5.0419

The last line says: For each combination of pool plan, basic price formula and supply-demand adjuster, c_j is smallest in markets having a seasonal class differential (c_{1tuv}), next smallest in markets with a Louisville plan (c_{3tuv}), second largest in markets with a base-excess plan (c_{2tuv}) and largest in markets with no seasonal incentive plan (c_{4tuv}). To compare c_{1tuv} with c_{2tuv}, compare line L (L = 1, 2, ..., 8) in table 3 with line L + 8; to compare with c_{3tuv}, use line L + 16; to compare with c_{4tuv}, compare line L + 24.

Likewise, it is seen that

$$a_{s1uv} < a_{s2uv}$$
$$b_{s1uv} \neq b_{s2uv}$$
$$c_{s1uv} > c_{s2uv} \; .$$

Also we find that

$$a_{st1v} < a_{st2v}$$
$$b_{st1v} = b_{st2v}$$
$$c_{st1v} = c_{st2v}$$

and that

$$a_{stu1} = a_{stu2}$$
$$b_{stu1} > b_{stu2}$$
$$c_{stu1} < c_{stu2} \; .$$

These comparisons hold three types of provisions fixed and vary the other provision. It is also possible to fix two provisions and vary the other two.

These results indicate that different blend prices can be expected at markets located equal distances from the surplus milk producing area in Wisconsin and having equal class I utilization, depending upon the types of federal-order provisions.

Hypotheses

A thorough review of the literature in the areas mentioned in the section on "Models" yields a great number of hypotheses. No one study can cover more than a few of them. In this study, we concentrated on these issues:

I. Recognition
  A. Ability of cooperatives to secure recognition from milk dealers as exclusive bargaining agent for the members
  B. Relation of recognition to volume of milk handled by cooperative
    1. Membership contracts
    2. Types of services offered to members to attract and hold members
    3. Mergers and federations as means of increasing volume

II. Type I bargaining power
  A. Services offered milk dealers
  B. Seeking favorable legislation and judicial decisions

III. Type II bargaining power
  A. Attitude toward milk strikes
  B. Alternative outlets for members' milk
  C. Demand for final products
  D. Alternative sources of milk for dealers

COOPERATIVE STUDY PROCEDURE

To study the issues just mentioned, managers of 10 different bargaining cooperatives were interviewed in the spring of 1964; information was collected on the 1963 operations of their cooperatives. The 10-page questionnaire used is presented in Hallberg (11). The managers were encouraged to expand on any topics peculiar to their individual situations that seemed relevant to the purpose of the study.

The 10 cooperatives were not selected by random sampling. They are a judgment sample selected to assure coverage of a wide range of operating conditions and bargaining results. We will interpret correlation and regression results as though we had a random sample. Although this may not be strictly valid, it seems better than treating them as purely descriptive statistics. Many of our inferences based on regression results are valid, however, if the data are taken as being generated by a "fixed X" or regression model. Johnston (15, ch. 4) discusses the "fixed X" model.

From these managers, information was collected on:

1. size and location of milkshed, importance of cooperative in the milkshed and in the retail market;
2. mergers, consolidations or federations;
3. services provided to members;
4. information on market conditions collected by cooperatives;
5. recent changes in the structure of retail and wholesale markets;
6. principal outlets for cooperatives' milk, alternative outlets for milk, prices in each market and transportation costs;
7. handlers' alternative sources of milk and price differentials;
8. services offered handlers;
9. participation in legal or administrative proceedings;
10. attitudes toward milk strike and
11. objectives of the cooperative.

CHARACTERISTICS AND MARKET ENVIRONMENT OF COOPERATIVES STUDIED

The cooperatives studied are listed in table 4.

Membership, as a percentage of total grade A producers, and cooperative volume, as a percentage of total volume in the milkshed, vary considerably. This is due to variations in the importance of independent producers and to variations in the amount of overlapping in the procurement areas. For example, there is considerable overlapping with cooperatives in eastern Iowa but practically no overlap in western Iowa.

External Factors Affecting the Cooperative's Bargaining Ability

Federal orders

The seasonal incentive plans, pooling arrangements, basic price formulas and supply-demand adjustments in order provisions influence blend prices. These influences may affect the strategy cooperatives want to take in federal-order hearings and in determining what revisions to seek in federal-order price formulas.

Federal orders may also be a substitute for a cooperative's bargaining power. A cooperative that is unable to negotiate a classified price plan with dealers can still operate under such a plan if it is in a federal-order market.

Some producers object to joining bargaining cooperatives because of the deductions made to reimburse the cooperative for services rendered members. Under a federal order, all producers have deductions used to reimburse the market administrator or the cooperative for weighing, testing and sampling milk and providing market information. Since he pays for these services, whether a member or not, a producer under a federal order may be less reluctant to join a bargaining cooperative. Thus, a federal order may have the side effect of increasing cooperative membership.

Structural changes

Table 5 lists recent structural changes which managers believed had affected the bargaining power of their cooperatives. The ability of larger firms to survive

Table 4. Membership and volume of cooperatives studied, 1963.

Cooperative	Membership: Total	Membership: Percent of total producers in area[a]	Annual volume of grade A milk: Total pounds	Annual volume of grade A milk: Pounds per member	Annual volume of grade A milk: Percent of total in area[a]
			(000)	(000)	
Burlington Cooperative Milk Producers Association, Burlington, Iowa	14	16	3,428	244.9	25
Cedar Valley Cooperative Milk Association, Waterloo, Iowa	320	54	125,000	390.6	54
Des Moines Cooperative Milk Marketing Association, Des Moines, Iowa[b]	912	70	259,633	284.6	70
Eastern Iowa Cooperative Dairy Producers Association, Cedar Rapids, Iowa[b]	430	55	135,589	315.3	55
Mississippi Valley Milk Producers Association, Moline, Illinois	540	50	186,300	345.0	50
Nebraska-Iowa Non-Stock Cooperative Milk Association, Omaha, Nebraska	1,489	97	486,900	327.8	95
North Iowa Cooperative Milk Marketing Association, Mason City, Iowa	62	51	25,000	403.2	60
Sioux City Milk Producer's Cooperative Association, Sioux City, Iowa	168	100	66,929	398.4	100
Pure Milk Association, Chicago, Illinois	12,000	40	2,700,000	225.0	40
Michigan Milk Producers Association Detroit, Michigan	11,917	79	2,898,496	243.2	57

[a] The percentages reported here are estimates provided by the respective cooperative managers. The exact numbers of grade A producers and volumes of grade A milk in these areas are unknown.

[b] These two cooperatives have recently merged but were in existence as individual cooperatives during 1963.

Table 5. Number of cooperative managers indicating their bargaining ability was affected by various structural changes in the dairy industry.

Structural change affecting the cooperatives' bargaining ability	Number of cooperatives
Growth in size of bottlers and mergers of bottling firms	8
Large-quantity buying by a single retail unit	6
Competition from bottlers in other markets due to different federal-order prices	9
Competition from bottlers in other markets due to a desire to expand total market area	9

at lower prices, to initiate price wars and to sign up their own independent producers was believed to have a major impact on these cooperatives' bargaining ability.

One cooperative had worked out an agreement with local bottlers whereby the cooperative would take on as members those farmers supplying milk to a firm being acquired by a local bottler (whether this firm being acquired was located within or beyond the cooperative's procurement area). This type of agreement may enable the cooperative to increase its control over the milk supply in its procurement area and to reduce average milk-hauling costs by reorganizing its pickup routes. Under such an arrangement, the local handler is spared the expense of picking up milk from producers previously supplying the acquired firm.

Several managers believed that the development of large-quantity buying by a single retail unit had affected the bargaining power of their cooperatives. The size of some retail accounts has reached such proportions in recent years that the handler cannot afford to lose these accounts. The handler will typically contract with these outlets for a delivery date and price far in advance of negotiations with the cooperative. The handler is certain of the price he will get for his bottled milk and can use this as an argument for either paying no premium to the cooperative or for refusing to pay a higher premium. Thus, the cooperative's job of bargaining for a higher price is made much more difficult. Three of the four cooperatives who did not believe that this type of change had affected them were cooperatives in small markets where bottlers have few large retail outlets from which to secure such contracts.

Competition from handlers in other markets may result in a lost market for the cooperative's fluid milk sales and in a reduction of the cooperative's ability to negotiate a premium.

Influence of nearby markets

Managers believed that they would be in a strong position to negotiate a premium or an increase in their premium if one or more nearby cooperatives had been able to negotiate a premium or an increase in premium. Managers thought they could use the gains won by a nearby cooperative as leverage against the local handlers.

A successful strike may be beneficial to the cooperative calling the strike and to cooperatives in nearby markets as well. It can make bottlers in nearby markets aware of the possible results of a milk strike in their own markets and, therefore, less reluctant to negotiate with cooperatives. Using prices published by the U. S. Department of Agriculture (33) and the transportation cost function computed by Butz (6), we estimated the cost to handlers of obtaining milk from various alternative sources. This function is: transportation costs in cents per hundredweight $= 3.4 + 0.16\ X$, where X is miles between markets. The bottlers served by each cooperative studied could have obtained milk in 6 or more months of 1963 at a lower price than they paid the local cooperative. Hence, if a cooperative in one of these 10 markets called a milk strike, his bottlers would probably be able to get milk from an alternative source for a net price no higher than the cooperative is presently getting.

Unless prices are kept in line in the various markets, bottlers may secure milk from an alternative source, even if the cooperative does not call a milk strike. Thus, there is good reason for cooperatives to attempt to keep prices in line in two or more markets.

Some of the managers interviewed attempt to work together to keep dealers' milk buying prices in line in different markets—largely through federated activities, as will be discussed in the section on "Mergers and Federations." Some cooperatives refuse to ship milk into markets in which another cooperative is attempting to gain a reasonable premium by withholding milk.

However, this spirit of cooperation does not exist among all dairy cooperatives. In one instance, a cooperative withholding milk from a handler who refused to pay the cooperative's asking price was forced to lower its asking price since another cooperative agreed to ship milk to this handler at a lower price. In another case, a fluid-milk cooperative (call it A), not located in a federal-order market and not covered in this study, is alleged to charge handlers in its market a price considerably below the federal-order price in two nearby federal-order markets, thus making it nearly impossible for the two cooperatives (call them B and C) in these markets to negotiate a premium on class I milk. Cooperative A has refused to agree to an expansion of the federal-order market which would include its marketing area and which would facilitate the process of keeping prices in line in these three markets. Such actions on the part of nearby cooperatives such as A seriously restrict the effectiveness of cooperative bargaining activities of B and C.

In such cases, the cooperatives may be involved in prisoners' dilemma games. It is possible that total receipts by members of cooperatives A, B and C would be higher if they cooperated with each other but that the members of cooperative A would receive less by working with B and C. The gain to the members of B and C comes at the expense of the members of A. Possibly this could be converted into a cooperative game if provisions could be made for arbitration or side payments; i.e., for assuring that A's members would share in the joint gain obtainable if A cooperates with B and C.

State and local regulations

Many state and local milk regulations tend to impede the interstate flow of milk and thus pose a limitation to the efficient geographic distribution of milk production (34).

The effect of restrictive regulation in any market is to limit the number of potential sources of milk for bottlers located in the market. This tends to enhance the bargaining power of the cooperative whose members are regular suppliers to this market. It also tends to weaken the bargaining power of the cooperatives who might supply milk to the market in the absence of restrictive regulation.

There are at least two instances in which this type of regulation affects the cooperatives in this study. Before milk may be shipped into the city of Burlington, Iowa, the milk producer must receive a permit to do so and pay an inspection fee of $10 per year. Similarly, to ship milk into St. Louis, Missouri, an inspection fee of 4 cents per hundredweight is required unless waived by the local authorities. Such fee requirements do not absolutely prevent the shipment of milk into Burlington and St. Louis; but they mean an additional expense that may make these markets an uneconomic alternative outlet and, hence, reduce a cooperative's bargaining power.

Information Secured by Cooperatives

Demand for milk and milk products

Table 6 provides an indication of the extent to which the managers interviewed attempt to keep informed about the conditions of demand for milk and milk products. One manager listed only one of the 11 sources and a second only four. The remaining eight managers listed at least six of the sources shown in table 6.

Alternative sources of milk for handlers

Every manager interviewed was quite aware of the existence and location of alternative supplies of milk. Most of the cooperatives mentioned as alternative sources of milk were located within the milkshed of federal-order markets.

The cooperatives studied—with the exception of the Chicago and Detroit cooperatives—also were aware that their entire volume could easily be replaced by milk from these alternative sources. The amount of milk received by bottlers in several federal-order markets in the North Central Region which was in excess of fluid milk or class I sales is shown in table 7. This milk, it is hypothesized, could have been used as class I milk in other markets.[4] By comparing the total 1963 volume of the cooperatives studied (table 4) with the 1963 volume of surplus milk available from the markets (table 7), it is seen that there was sufficient milk to replace the entire volume of any of the cooperatives studied except Chicago and Detroit.

The Detroit cooperative controls practically all milk produced in Michigan through its own operations and through the operation of a federation of all Michigan dairy cooperatives. Thus, Detroit bottlers would not be likely to secure milk from any other Michigan federal-order market during a withholding action. Similarly Detroit bottlers would probably get no milk from Fort Wayne or Toledo because of the existence of the Great Lakes Milk Marketing Federation. In addition, the

[4] This does not, of course, exhaust the entire supply of surplus milk that could have been used for class I milk in other markets, but it is believed to represent the major portion of the total since most of the major fluid milk markets are regulated by federal orders even though much of the area in some states is not regulated by a federal order. Adequate data with which to estimate the total amount of surplus milk available from unregulated markets is not available.

Table 6. Number of managers securing various types of information on the demand for milk and milk products.

Information secured	Number of cooperatives
Supply-demand adjustment in effect in the order	3
Sales to handlers	8
Reports from handlers	7
Price changes at retail	6
Changes in other federal-order price formulas	8
Changes in CCC support purchases of surplus products	6
Changes in CCC support price level	6
University outlook information	4
Success or failure of other cooperatives in negotiating with handlers	8
Farm or trade publicatons	4

Table 7. Producer milk used for purposes other than class I by regulated handlers in several North Central federal-order markets, 1963.[a]

Federal-order market	Pounds (000)
Chicago	3,596,662
South Bend-LaPorte-Elkhart	52,460
Rock River Valley	26,292
Milwaukee	127,615
Southern Michigan	1,527,003
Muskegon	43,112
Upstate Michigan	26,772
Michigan Upper Peninsula	33,266
Northeastern Wisconsin	196,699
Madison	64,661
Quad Cities-Dubuque	92,658
Nebraska-Western Iowa	105,754
Sioux City	19,154
Minneapolis-St. Paul	420,008
Duluth-Superior	69,049
Cedar Rapids-Iowa City	84,097
North-central Iowa	38,083
Des Moines	78,806

[a] Source: U. S. Dept. Agr. Federal milk order market statistics, annual summary for 1963. U. S. Dept. Agr. Stat. Bul. 345. 1964.

Chicago cooperative would probably not supply milk to Detroit bottlers during an attempt by the Detroit cooperative to negotiate a premium.

Chicago handlers are not likely to get milk from other cooperatives in Chicago, Michigan, Toledo or Fort Wayne during an attempt by the Chicago cooperative to negotiate a higher price for its milk. A federation of Chicago-area cooperatives exists. Since the Chicago cooperative controls about 40 percent of the total grade A milk production in its procurement area, which includes the entire market area of the Milwaukee, Rock River Valley and South Bend-LaPorte-Elkhart federal orders and about one-fourth of the Madison federal order, it may control as much as 125 million pounds of the surplus milk available from these latter four federal orders.

Combining the remaining amount of surplus milk in these last four markets with that of the other federal-order markets listed in table 7, we get slightly over 1.25 billion pounds of surplus milk. Assuming 15 percent of this surplus milk is needed to meet (a) day-to-day fluctuations in milk receipts, (b) seasonal fluctuations in milk receipts and (c) day-to-day fluctuations in sales of milk products, we are left with 1.06 billion pounds of surplus milk available to Chicago and Detroit handlers —enough to replace 39.3 percent of the Chicago cooperative's volume or 36.6 percent of the Detroit cooperative's volume. As will be noted in the later subsection "Attitude Toward Striking," the amount of the cooperative's volume replaceable from alternative sources may be an important factor in the cooperative's d sire to call a milk strike.

These figures may underestimate the amount of milk that would be available to Chicago and Detroit bottlers if cooperatives supplying these markets withheld milk. In 1963, in the 13-state area covered by the 12 north-central states plus Kentucky, 9.1 billion pounds of grade A milk were used in other than class I products in federal-order markets. From this figure, if we deduct the class II milk in the markets listed in the two preceding paragraphs and in the Northeastern Ohio order, which would not be available to Chicago and Detroit bottlers, and then deduct 15 percent of the remainder, we obtain 3.4 billion pounds of milk. This represents the amount of milk that could have been available to Chicago and Detroit bottlers from all federal-order markets in the region other than the excluded ones. This figure is only about 25 percent greater than the annual volume of the Chicago cooperative, 20 percent greater than the annual volume of the Detroit cooperative and about 60 percent of their sum. It is evident that Detroit and Chicago bottlers would be hard pressed to find milk if the cooperatives in these markets called a milk strike.

Farmers supplying these two markets receive substantial premiums over federal milk-marketing order prices—much larger premiums than farmers in other markets receive. These findings on the scarcity of alternative sources of milk for these two markets and the abundance of alternative sources of milk for other markets do much to explain the differences in premiums among the markets.

Alternative outlets for the cooperative's milk

Only two of the cooperatives studied—Waterloo and Cedar Rapids—shipped a substantial volume of milk to fluid-milk markets in the South. Three other cooperatives shipped small amounts as requests came from cooperatives in other markets.

The only alternative outlet for the cooperative's milk suggested by the remaining cooperative managers was the surplus milk processing facilities owned by the cooperative or owned by nearby cooperatives. Usually these were butter and nonfat dry milk processing plants. Evidently, if an alternative outlet was for some reason needed for milk now used in class I, most of the cooperatives studied would market this milk in lower-valued outlets other than class I.

Services for Members

One way for a cooperative to develop membership support and loyalty is to provide other services to members in addition to price negotiation. The data in table 8 show the number of cooperatives studied that provide various services to members. The first three services constitute the cooperative's price-bargaining activities. The other services are intended to expand the demand for the members' product, increase the efficiency of members' production and provide resources used in the production of milk at a discount.

COOPERATIVE OBJECTIVES

In this study, information was collected from each cooperative manager on the objectives of his cooperative and on the relative importance of each objective. Since the objectives of a firm are important in determining

Table 8. Services provided members by the cooperatives studied.

Service provided members	Cooperatives providing the service
Bargaining for the price of milk	10
Bargaining for a service charge premium	10
Bargaining for a bulk tank premium	9
Conduct quality improvement work for use by members	10
Conduct quality education programs for members	10
Conduct quality control and inspection programs	10
Test and weigh milk	9
Help members achieve production efficiency	7
Stock and distribute milk production supplies	10
Assemble market information for use by members	9
Pick up and deliver milk	6
Provide insurance policies for members	8
Provide credit for members	6
Acquire and maintain facilities for handling surplus milk	9
Engage in local promotional programs	10
Contribute money to the programs of the American Dairy Association	8

Table 9. Importance of various objectives to nine dairy bargaining cooperatives studied.

	Cooperative rankings[a]									Pooled ranking
	1	2	3	4	5	6	7	8	9	
1–Negotiating a price that will give members the highest possible net return for milk	1	3	5	4	2.5	2.5	1	5	1	2
2–Maintaining a market for members' milk	2	1	1.5	1	2.5	1	2	3	2	1
3–Maintaining past highest percentage of class I sales	5	2	3	3	2.5	4	3	4	4	3
4–Securing 100-percent control of milk produced in procurement area	4	4	4	6	5	7	6	1	6.5	5
5–Increasing the size of procurement area	7	7	7	7	7	6	7	7	6.5	7
6–Negotiating for the estimated value of services performed for handlers	3	6	6	5	6	5	5	6	3	6
7–Maintaining good relations with handlers	6	5	1.5	2	2.5	2.5	4	2	5	4
	Rank correlation between cooperative rankings and pooled ranking[b]									
	0.643	0.929	0.704	0.821	0.889	0.830	0.929	0.393	0.722	

[a] Tied rankings are each assigned the average of the ranks they would have been assigned had no ties occurred.

[b] Spearman rank-correlation coefficient corrected for tied rankings. To be significant at the 5-percent level, this coefficient must equal or exceed 0.750 and, at the 10-percent level, 0.626 (see 16).

its actions and since objectives can vary among firms, it would be useful to know if a firm's objectives are to some extent predictable. This question was also studied.

From discussions with the managers of the cooperatives studied and with Cooperative Extension Service specialists who have worked with dairy bargaining cooperatives, a list of seven possible objectives of dairy bargaining cooperatives was developed. Each manager was asked to rank each objective according to its importance to his cooperative, assigning a rank of 1 to the most important, 2 to the second most important, and so on. We carefully tried to include on the list every perceived objective of every manager interviewed. Whether we succeeded or not we do not know, but no manager suggested that we had left off an important objective. The objectives and their rankings are shown in table 9. (One manager did not rank the objectives.)

The information in table 9 shows that dairy bargaining cooperatives place greater importance on some objectives than on others. Evidently some of these cooperatives have a hierarchial goal system in which objectives are ordered lexicographically (25, pp. 232-234). The manager of cooperative 2, for example, explained his ranking as follows: "Only if we have a market for our milk, can we hope to maintain our class I sales, and not until we are assured of a market for our class I sales, can we hope to bargain for the price of this milk. To support our bargaining ability, we need to control the supply of milk and to maintain good relations with handlers. Only after all these have been achieved will it benefit us to increase our volume."

To test the null hypothesis that there is no agreement among the nine rankings of the objectives, Kendall's coefficient of concordance, W, is used (16). W provides a measure of the degree of association or agreement among a set of $k > 2$ rankings. Its range is from zero to unity; zero indicating no agreement among the k rankings, and unity indicating perfect agreement. (If $k = 2$, then the Spearman rank-correlation coefficient can be used. It has a range of –1 to 1.)

The computed W for the data in table 9 was 0.615, which is significantly different from zero at the 1-percent level. Thus, the null hypothesis of no agreement among these nine rankings must be rejected. There is reason to believe that the nine cooperative managers were applying essentially the same underlying standards in ranking these objectives. One estimate of this standard suggested by Kendall (16) is the pooled ranking obtained by ranking each objective according to the sum of the ranks assigned to it, the one with the smallest sum being ranked first. If, for two or more objectives, the sums are equal, we rank them according to the sum of squares of the individual ranks assigned to them, the one with the smaller sum of squares being ranked first. This pooled ranking is shown in the last column of table 9.

The correlations shown in the last row of table 9 are the rank-correlation coefficients between each cooperative's ranking of the objectives and the pooled ranking of the objectives.

Different cooperatives may have different aspirations. Each cooperative's aspirations may be conditioned by various factors peculiar to the individual cooperative. For example, the three managers giving the first objective the highest rank had sufficient processing facilities to handle at least 60 percent of their entire volume. The remaining six cooperatives could not handle this much of their milk in their own processing plant.

This suggests the desirability of investigating the degree to which various physical and environmental attributes of the cooperative may influence its ranking of these objectives.

Multiple regression is one procedure for measuring this influence. It will (a) enable us to determine which characteristics were most important in explaining why the cooperatives ranked the seven objectives differently and (b) provide a means of predicting how cooperatives will rank the objectives given a change in the level of one or more of their physical and environmental attributes.

A separate analysis was conducted on each of the seven objectives. For each, the nine rankings of the objective was the dependent variable. Seventeen different attribute variables of the nine cooperatives were initially considered as possible candidates for independent variables in each analysis. Attributes not significantly correlated with the dependent variable at the 30-percent confidence level were eliminated from further consideration.

The procedure used was to fit, by least squares, regression equations of the form

$$(12) \quad Y_{ij} = \alpha_i + \sum_k \beta_{ik} X_{kj}$$

where Y_{ij} is the ranking of objective i (i = 1, 2, ..., 7) by cooperative j (j = 1, 2, ..., 9) and X_{kj} is the value of X_k for cooperative j, using different combinations of X_k. If no independent variables were found to be significantly related to the dependent variable, the model was reduced to $Y_i = \alpha_i$ where α_i is simply an estimate of the mean of Y_i, $\overline{Y_i}$.

The Y_{ij} are numbered as in table 9: The X_{kj} are:

X_1 = percentage of the local bottlers with which the cooperative attempted to bargain in 1963 who would bargain—i.e., the cooperative's ability to secure recognition as the exclusive bargaining agent,

X_2 = average volume per bottler with which the cooperative bargained in 1963 in millions of pounds,

X_8 = bottler's buying price for 3.5-percent producer milk for fluid use in 1963 in cents per hundredweight,

X_9 = percent of the cooperative's volume sold to class I outlets,

X_{10} = annual average 1963 negotiated premium on class I milk in cents per hundredweight,

X_{11} = number of class I bottlers who would bargain with the cooperative in 1963,

X_{13} = percentage of the cooperative's volume that could have been handled in the cooperative's own processing plant and

X_{16} = approximate number of dairy cows per thousand crop acres in the cooperative's procurement area, 1962.

Selected equations with standard errors of the estimates in parentheses are:

$$(13.1) \quad Y_{1j} = \underset{(0.00138)}{0.00904} X_{8j} - \underset{(0.01085)}{0.03112} X_{13j} \qquad R^2 = 0.8755$$

$$(13.2) \quad Y_{2j} = \underset{(0.01455)}{0.09754} X_{2j} \qquad R^2 = 0.8506$$

$$(13.3) \quad Y_{3j} = \underset{(0.00928)}{0.02777} X_{9j} + \underset{(0.01390)}{0.03349} X_{16j} \qquad R^2 = 0.8934$$

$$(13.4) \quad Y_{4j} = \underset{(0.06958)}{-0.08377} X_{2j} + \underset{(0.01775}{0.08768} X_{9j} \qquad R^2 = 0.9102$$

$$(13.5) \quad Y_{5j} = \underset{(0.11785)}{6.83333} \qquad R^2 = 0.9976$$

$$(13.6) \quad Y_{6j} = \underset{(0.00374)}{0.05410} X_{1j} \qquad R^2 = 0.9631$$

$$(13.7) \quad Y_{7j} = \underset{(0.23208)}{2.01042} + \underset{(0.00335)}{0.00722} X_{11j} + \underset{(0.00506)}{0.02941} X_{13j} \qquad R^2 = 0.9875$$

The addition of X^2_2 or X^2_9 to equations 13.2 to 13.4 yielded significant coefficients. These equations are

$$(13.2a) \quad Y_{2j} = -0.289 X_{2j} + 0.0966 X_{9j} + 0.0114 X^2_{2j} - 0.000739 X^2_{9j} \qquad R^2 = 0.9808$$

$$(13.3a) \quad Y_{3j} = 0.108 X_{9j} + 0.0182 X_{16j} - 0.000939 X^2_{9j} \qquad R^2 = 0.9417$$

$$(13.4a) \quad Y_{4j} = -0.193 X_{2j} + 0.225 X_{9j} - 0.00146 X^2_{9j} \qquad R^2 = 0.9538 .$$

All equations except 13.5 and 13.7 are homogeneous; i.e., $\alpha_i = 0$. All coefficients are significantly different from zero at the 10-percent level, except for the coefficient of X_2 in equation 13.4.

Since the objectives were given a value of 1 if considered most important and 7 if considered least important, the derived equations and predictions should be interpreted accordingly. Furthermore, since the Y_{ij} are ordinal values, no quantitative meaning should be placed on the predicted values—they should be used only in comparing (i.e., in ordering) the seven objectives. The predicted values will not necessarily fall within the 1-7 range as the objectives were ranked; however, their ordinal character will still be preserved. For example, suppose we are comparing the predicted rankings by cooperatives 1, 2 and 3 of objective 1,

$$\hat{Y}_{1j} = a_1 + \sum_k b_{1k} X_{kj}$$

and we obtain $\hat{Y}_{11} = -0.9$, $\hat{Y}_{12} = 4.6$ and $\hat{Y}_{13} = 9.2$ as shown in table 10. We conclude that this objective is ranked higher by cooperative 2 than by cooperative 3 and is ranked higher by cooperative 1 than by cooperative 2.

Table 10. Hypothetical example of results from equations 13.1 and 13.2.

Objective i	Cooperative j					
	1		2		3	
	$\hat{Y}_{i1}$	R_{i1}	$\hat{Y}_{i2}$	R_{i2}	$\hat{Y}_{i3}$	R_{i3}
1	-0.9	1	4.6	2	9.2	2
2	6.8	2	3.1	1	0.6	1

Judging by R^2, it can be seen that most of the variation in the Y_{ij} was explained. In addition, Snedecor's F, for testing the null hypothesis that all coefficients estimated for a given equation are zero, was significant at the 1-percent level for all equations; therefore, the null hypothesis must be rejected.

Equation 13.1 indicates that, on the average, the nine cooperatives considered the first objective less important, *ceteris paribus,* the higher was handlers' buying price for producer milk. For a given price, on the other hand, this objective was ranked more important if the cooperative could handle a large portion of its total volume in its own processing plant. Distance from Eau Claire was also significantly correlated with Y_1, but was not used in the equation because of its influence on the federal-order class price and therefore on the bottler's buying price. Per-capita income in major metropolitan areas served by the cooperative was also significantly correlated with the cooperative's ranking of objective one. Equation 13.2 suggests that cooperatives with a relatively large volume per bottler considered maintaining a market for members' milk less important that did cooperatives with a small volume per handler. Table 9 shows, however, that this objective was never ranked lower than third.

X_9 was related to the rankings of the third and fourth objectives in the same general way. Cooperatives having a low class I sales percentage generally considered these two objectives more important than did cooperatives having a high class I sales percentage. In addition, X_{16} was positively related to Y_3, and X_2 was negatively related to Y_4. If cooperatives with a low volume per handler located in an area where X_{16} is small had class I outlets for only a relatively small portion of their milk, it evidently was quite important for them to be assured of a market for all their milk and to maintain their class I outlets.

No cooperative characteristics were significantly related to Y_5. By using the two-tailed "t" test, the mean of Y_5 is found insignificantly different from 7 at the 1-percent confidence level.

Equation 13.6 indicates that, on the average, those cooperatives having more difficulty in securing recognition as the exclusive bargaining agent of their members consider negotiating for the value of services a rather important objective. Finally, equation 13.7 suggests that the more handlers with which a cooperative bargains and the more facilities it has for processing milk, the less important does the cooperative find it to maintain good relations with handlers.

The simple correlation coefficients indicated that several other variables were significantly correlated with Y_6 and Y_7. The influence of these other variables was, however, overshadowed by the variables actually used.

These other variables correlated with Y_6 were X_2, and X_6, X_{10} and X_5 (= cooperative's estimate of the value of services provided to handlers). The other variables correlated with Y_7 were X_5, X_6, X_8, X_{10}, X_7 (= percentage of the cooperative's volume replaceable by handlers from other sources) and X_{14} (= number of grade A producer members of the cooperative).

Volume per handler, X_2, affects X_1, while X_5, X_6 and X_{10} influence X_8. We would expect that X_8 will be related to the current rankings of the last two objectives through its influence on other variables, including X_{11}.

Also, it seems reasonable to expect that the more members a cooperative has, X_{14}, the more outlets, X_{11}, will be needed. Finally, dairy cooperatives whose entire volume is not replaceable from alternative sources may be in a better position to withhold milk and thus may want the assurance of an outlet for withheld milk so that this milk will not have to be dumped. Securing processing facilities is one way of getting this assurance.

Each of these equations was estimated for the purpose of making intercooperative comparisons; i.e., of predicting which cooperatives would rank a given objective relatively high or low compared with the ranking given it by other cooperatives. Can these same equations be used for a different purpose: predicting which objectives are of greater or lesser importance than other objectives to a given cooperative? The nature of the problem is illustrated in table 10. Suppose that we are dealing with only two objectives and three cooperatives and that equations 13.1 and 13.2 yield the predictions in table 10. The second line shows that objective 2 is ranked higher by cooperative 3 than by cooperative 2 and higher by cooperative 2 than by cooperative 1. To use these results to predict cooperative j's rankings, we proceed as follows. Since $\hat{Y}_{11} < \hat{Y}_{21}$, cooperative 1 is predicted to rank objective 1 higher than it ranks objective 2. R_{11} is set equal to 1, R_{21} is set equal to 2. For the other cooperatives, j = 2, 3, $\hat{Y}_{1j} > \hat{Y}_{2j}$. Hence, $R_{1j} = 2 > R_{2j} = 1$.

How well does R_{ij} predict the actual rankings assigned by cooperative j? To answer this, compute the rank correlations between the predicted values R_{ij} for each cooperative and the actual rankings of that cooperative. The results obtained from equations 13.1 to 13.7 are presented in table 11.

Table 11. Comparison between actual and predicted rankings for each cooperative.

Cooperative[a]	Untied rankings predicted incorrectly	Spearman rank-correlation coefficient[b]
1	2	0.964
2	2	0.964
3	3	0.884
4	2	0.964
5	0	0.911
6	2	0.955
7	2	0.964
8	2	0.964
9	5	0.866

[a] Cooperative numbers in this table correspond to those in table 9.

[b] Corrected for tied rankings.

The Y_{ij} for each cooperative was predicted, and the seven objectives were ranked according to these predicted values. The computed rank-correlation coefficients between actual and predicted ranks were significant at the 1-percent confidence level for every cooperative. Although several ranks were predicted incorrectly, in no case did the predicted rank differ from the actual rank by more than 1.

It was suggested that dairy bargaining cooperatives have a multidimensional or hierarchial goal system. If this is true, the cooperative's preference function for various bargaining strategies may be lexicographically ordered (25, pp. 232-234) — i.e., the cooperative will first seek to attain its most important objective. After being sure of attaining this, it will seek to attain its second most important objective, etc. Thus, if one could determine the importance of each of the several objectives to a given cooperative, one may be able to determine also what bargaining strategy will be selected.

For example, if the cooperative's major objective or aspiration is to maintain its past highest percentage of class I sales, it may be willing to sacrifice some of its premium to achieve this objective. Thus, its bargaining strategy may be quite different than if its major objective is to achieve the highest possible net return for members' milk. Further, each cooperative's rankings seem dependent on their peculiar characteristics and may thus be expected to change as these characteristics change.

Equations 13.1 to 13.7 do provide a means by which one can determine the importance of various objectives to dairy cooperatives.

There are problems associated with the use of regression to predict ranks, as was done here. (a) The Y_{ij} are integer or integer plus half and $7 \geqslant Y_{ij} \geqslant 1$; the $\hat{Y}_{ij}$ need not possess either of these properties. We used regression to predict ordering; its usual purpose is to predict or estimate magnitude. Thus, there is a question as to the proper interpretation of t and F tests. (b) Rankings may be interdependent in two ways. (b.1) Each manager's rankings may be influenced by the rankings assigned by other managers. (b.2) The rank a manager assigns one objective may be affected by the rank he assigns other objectives or by his degree of success in attaining other objectives. We plan to discuss these problems and possible methods of handling them in a later report.

MEANS OF SECURING BARGAINING GAINS

Recognition

Each cooperative manager was asked the following question: Of those processors and distributors with which you attempted to bargain in 1963, how many would and how many would not bargain with you? The answers to this question are recorded in table 12.

It was hypothesized that, if the cooperative does not have a sufficient volume of milk, it will not be able to secure recognition from its handlers. Furthermore, it seems plausible to expect that there is a point beyond which a larger volume would have no effect on the cooperative's ability to secure recognition.

Table 12. Ability of the dairy bargaining cooperatives studied to secure recognition as exclusive bargaining agent, 1963.

Cooperative[a]	Proportion of handlers who would bargain[b]
1	99
2	100
3	94
4	100
5	100
6	100
7	93
8	100
9	33
10	100

[a] Cooperative numbers correspond to cooperative numbers listed in table 9.

[b] Does not include out-of-state handlers.

To test these propositions, the following statistical model was proposed:

$$\log X_{1i} = \alpha + \beta/X_{2i} + \epsilon_i \quad (14)$$

where X_{1i} = the percentage of the local bottlers with which cooperative i attempted to bargain in 1963 who would bargain with the cooperative,

X_{2i} = average 1963 volume of bottlers with which cooperative i bargained in 1963 (million pounds).

If $\beta < 0$ this model yields an asymptote at 10^{α} — i.e., as X_2 approaches infinity, X_1 approaches 10^{α}. It also yields a point of inflection in the positive quadrant:[5] at $X_2 = -k\beta/2$. Since a value of $X_1 > 100$ is meaningless, we expect $\alpha \leqslant 2$. For $-k\beta/2 > X_2 > 0$, X_1 increases at an increasing rate, while for $X_2 > -k\beta/2$, X_1 increases at a decreasing rate.

The following estimates (with standard errors in parentheses) were derived by least squares from the data in tables 4 and 12:

$$a = 2.02906\ (0.00799)$$
$$b = -0.57749\ (0.02678)$$
$$-kb/2 = 0.66486\ (0.03084)$$
$$R^2 = 0.98309$$
$$e = \frac{X_2 dX_1}{X_1 dX_2} = -kb/X_2 = 1.32972/X_2$$

where e = the percentage change in X_1 associated with a 1-percent change in X_2.

Using the one-tailed "t" test, the null hypothesis that $\alpha \leqslant 2$ must be rejected in favor of the alternative hypothesis that $\alpha > 2$ at the 1-percent confidence level;

[5] $k = \log_e 10 = 2.30259$.

b and $-kb/2$ are significantly different from zero at the 1-percent level. At various levels of X_2, we obtain the results in table 13 (where $d = dX_1/dX_2 =$ the absolute change in X_1 associated with a unit change in X_2).

We conclude that there is a positive relationship between volume per handler and dairy bargaining cooperatives' ability to secure recognition as the exclusive bargaining agent for their members. Cooperatives may benefit from economies of large-scale operations just as can processing firms.

A simple regression of 1963 operating costs in cents per hundredweight (C) on total 1963 volume (V) in billions of pounds for six cooperatives yielded the following results (with standard errors of estimates in parentheses):

$$(15) \quad C = \underset{(0.5003)}{6.0059} - \underset{(0.3078)}{0.9118}\ V \qquad R^2 = 0.6883$$

Although the coefficient on V is significantly different from zero at the 5-percent confidence level, it takes a sizable increase in volume to have any appreciable effect on C.

There are also disadvantages to increasing volume—i.e., (a) a tendency toward reduced support given to the cooperative's goals and (b) a possibility of an increase in the cooperative's proportion of surplus milk. Increasing volume may mean increasing the number of members, which tends to be accompanied by more intragroup conflict and by a reduction in group unity and cohesiveness. The end result may be a reduction in the amount of support given to the organization's goals.

As a cooperative's volume increases with no corresponding increase in class I sales, the cooperative's volume of surplus milk relative to total volume will increase. Members' net price will be reduced. This may explain why increasing the size of the cooperative's procurement area was not considered a more important objective by the cooperatives studied.

Membership agreements

All but one cooperative studied required members to sign a marketing agreement. The producer agrees to consign to the cooperative all milk produced on the farm (except that consumed by the farm family) and to allow the cooperative to market this milk together with that of all other members as it deems is in the best interest of all members.

Table 13. Values of e and d computed from equation 14 for various values of X_2.

X_2	e	d
0.66	2.000	44.23
2.00	0.665	18.28
5.00	0.266	5.01
10.00	0.133	1.25
15.00	0.089	0.57
20.00	0.067	0.33

All agreements contained a duration-of-contract and an automatic-renewal clause. Some agreements stipulated the amount of the membership fee and the deductions or limits to the deductions to be taken from producers' proceeds from the sale of milk. Four agreements contained a breach-of-contract clause and stipulated the amount to be levied against the faulty party. Several managers believed that a breach-of-contract clause and liquidated-damage clause were useless because they could not be enforced or were too difficult and time consuming to enforce. An important question then is what means does the cooperative employ to prevent a breach of contract.

Several managers pointed out that it is more important to be able to prevent such problems before they happen rather than to be able to penalize members. To do this, various services that are generally not available to nonmembers are provided to members (see table 8). Attempts to keep up membership loyalty are also made through distribution of cooperative earnings, personal contacts with members by fieldmen, group membership meetings and various reports, including monthly newsletters and market information letters.

Mergers and federations

One way for a dairy cooperative to increase its volume is to sign up more producers in its procurement area—either independent producers or members of another cooperative—if it does not have 100-percent control of these producers. There are limitations to this type of activity, however. First, it leads to poor relations between two or more cooperatives. Second, adding more members and therefore increasing volume without at the same time increasing the number of fluid-milk outlets will result in an increased percentage of surplus milk and in a lower net price to farmer-members. There was no evidence suggesting that any of the cooperatives studied attempt to secure the members of other cooperatives. Most of them do, however, attempt to sign up independent producers.

Another method of increasing volume is through a merger. Since individual cooperatives lose their previous identity and autonomy in a merger by pooling membership, volume, resources and outlets for milk, both of the limitations just mentioned can be eliminated through this method of increasing volume. There are, of course, problems that have to be worked out by all members to eliminate or reduce conflict within the new organization. For example, how many members shall each cooperative contribute to the board of directors? Who shall pay the burden of the previous cooperatives' debts? How shall milk be pooled (that is, how shall members of each cooperative involved in the merger share in the proceeds of the new cooperative)?

There have been a large number of dairy cooperative mergers in recent years. Between 1958 and mid-1964, five of the cooperatives studied had particiapted in various mergers which had involved 17 other cooperatives in total.

A cooperative federation, in contrast to a merger, involves a uniting of two or more cooperatives by covenant so that each of the participating cooperatives retains its local autonomy and identity. Thus, the problems of consolidating two or more cooperatives into one are eliminated. Competition among member cooperatives is still possible even though one of the objectives of a federation is to coordinate the marketing activity of all cooperatives in the group. Further, maintaining "esprit de corps" among member cooperatives may become difficult. A decision desirable from the long-run standpoint of all farmers involved in the federation may not be desirable to the members of one individual cooperative. Pooling arrangements are a problem to be worked out by the individual cooperatives in the federation.

Two different types of federations may be formed. One is the regional federation, which is exemplified by: (a) United Dairy Producers Cooperative, organized in 1960, consisting of the Des Moines, Cedar Rapids, Waterloo and Moline cooperatives; (b) Central Southwest Regional Stock Cooperative, organized in 1964, consisting of the Omaha cooperative, the Denver Milk Producers Association, the Southwest Milk Producers Association in Wichita, the Central West Texas Milk Producers Association in Abilene and the Dairy Farmers Cooperative Association in Albuquerque; and (c) the Great Lakes Milk Marketing Federation, organized in 1960, consisting of the Detroit cooperative, Northwest Cooperative Sales in Toledo, the Cleveland Milk Producers Federation, the Dairymen's Cooperative Sales Association in Pittsburgh, the Akron Milk Producers Association and the Wayne Cooperative Milk Producers in Fort Wayne.

Federations such as these perform several valuable functions. (a) They can eliminate duplication of routes and capitalize on economies of scale in farm-to-market milk hauling when procurement areas overlap. (b) They may operate a centralized sales agency to coordinate off-the-market sales. (c) They can work to establish reasonable or proper price relationships between markets regulated by separate federal orders. (d) They may bargain jointly with 10 to 15 stores of a national chain to replace a situation where each cooperative bargains with two or three stores of that chain. (e) The federation can coordinate the movement of surplus milk between markets served by member cooperatives. (f) A federation can undertake joint bargaining efforts to replace the individual bargaining efforts of individual member cooperatives. The result of successful performance of these functions is to increase the bargaining effectiveness of all cooperatives in the organization.

Additional advantages of federations mentioned by managers were: (a) Federation allows the personnel of one cooperative to become better acquainted with the people and problems of other cooperatives. (b) It allows the trading of valuable information concerning the operations in nearby markets and the influence of these operations on one's own market and bargaining ability. (c) It allows the exchange of valuable information on conditions in the industry in general. (d) It eliminates the problem of acquiring additional surplus milk as a result of a merger.

The disadvantage mentioned by all managers involved in federations was the extreme difficulty of reconciling differences of opinion among members of different cooperatives in the federation. Personal problems between officials of different cooperatives in the federation are difficult to avoid and may become a threat to the effectiveness of the federation.

A second type of federated activity is exemplified by superpools—strictly joint-bargaining efforts between a number of local cooperatives in which the milk supply of all cooperatives is pooled, and the negotiated premium money is distributed to the members of these cooperatives on the basis of some predetermined pooling system. One superpool is in operation in the Chicago market in which the Pure Milk Association is a member along with 23 other cooperatives. A second superpool is in operation in southern Michigan in which the Michigan Milk Producers Association is a member along with eight other cooperatives. The characteristics and problems of these two federations are essentially the same as those of the three previously discussed. The difference is primarily in the emphasis placed on joint bargaining and in the area covered.

Federations do not increase the volume of any cooperative involved. Nevertheless, they allow joint control over a larger volume of milk than that of any one cooperative in the federation. For example, since all cooperatives in the Chicago and Detroit area bargain jointly with bottlers, if either of these groups of cooperatives decided to withhold milk from a bottler, this bottler would have to go outside the local market to get an alternative supply of milk unless local independent producers could provide enough milk to meet his needs. This is presumably more important for superpools than for federations placing less emphasis on joint bargaining.

Baumol (3) has argued, as mentioned earlier, that the prisoners' dilemma game is involved in the logic underlying government control in a democratic society. Cooperative mergers and federations may be rationalized on the same grounds or may be viewed as efforts to convert a prisoners' dilemma game or a noncooperative game into a cooperative game.

Type I Bargaining Power

One of the reasons that dairy bargaining cooperatives are able to negotiate a price for members' milk in excess of the federal-order minimum price is that they offer various services to milk dealers in return. Table 14 contains a list of the services offered to dealers by each cooperative studied.

Most managers believed that the cooperative's ability to full-supply bottlers was the most important service they could offer. In full-supplying a bottler, the cooperative agrees to provide exactly that quantity of milk needed by the handler. If assured of a full supply of

Table 14. Services offered bottlers by dairy bargaining cooperatives studied.

Service offered	Cooperative[a] 1	2	3	4	5	6	7	8	9	10
Producer check writing	X	X	X	X	X	X	X		X	X
Bulk handling of milk	X	X	X	X	X	X	X	X	X	X
Maintaining high quality milk	X	X	X	X	X	X	X	X		X
Product standardization			X		X	X		X		
Full-supply contracts	X	X	X	X	X	X	X	X	X	X
Wash bottlers tanks					X					
Diversion of surplus milk to:										
Own processing plant	X	X	X				X		X	X
Other processing plants		X	X	X	X	X	X	X		X
Pick up milk of producers supplying plants acquired by bottlers			X							
VALUE OF SERVICES OFFERED[b] (cents per hundredweight)	34	17½	20	12½	29	7½	7	7½	30	10

[a] Cooperative numbers correspond to the cooperative numbers shown in table 9.

[b] Estimated by the respective cooperative managers.

milk, the bottler processing milk only 5 days per week does not have to incur the costs of handling and storing milk received from producers during the remainder of the week. Also the bottler need not worry about failing to meet the demand for his product each day since day-to-day variations in his milk supply are eliminated. The cooperative agrees to find an outlet for any excess milk and to find an extra supply if the bottlers' demands cannot be met with member milk. All cooperatives studied indicated that they full-supply bottlers; however, there were no legal instruments used in connection with this service.

Each manager's estimate of the value to bottlers of the services provided by his cooperative is shown in table 14. Five of the cooperatives negotiate a premium on class I milk equal to the reported value of the services they provide.

If the price a bottler pays the local cooperative exceeds that which he would have to pay to get milk from an alternative source, we may take this excess to represent the value to bottlers of obtaining milk from the local cooperative.

To determine the extent of this excess for each cooperative studied, we take Eau Claire, Wisconsin, to be the region of heavy surplus production and the alternative source of milk for the bottlers of these cooperatives. On deducting, from the average annual bottlers' buying price for fluid milk in a given market, (a) the average annual bottlers' buying price for fluid milk in Eau Claire and (b) the cost of transporting milk from Eau Claire to the given market, we arrive at the data presented in table 15.[6] These data, then, are taken to represent an estimate of the value to bottlers of securing milk from the local cooperative in preference to securing milk from Eau Claire sources.

The data in table 15 suggest that most of the cooperatives studied were adequately paid for services rendered bottlers. In only one case was the calculated value to bottlers of securing milk from the local cooperative lower than the cooperative's estimate of the value of services offered. For one cooperative, the value recorded in table 15 exceeded the cooperative's estimate of the value of services provided by more than 20 cents per hundredweight.

Values similar to those in table 15 were computed for two markets in the Michigan upper peninsula and for three markets in southern Michigan. These computations yielded 45 cents for Kalamazoo, 38 cents for Muskegon, 34 cents for Traverse City, 10 cents for Marquette and 12 cents for Sault Ste. Marie. One manager's explanation for the lower values in the Michigan upper peninsula markets was that these two markets are closer to the alternative sources of milk than are the southern Michigan markets and, therefore, that bottlers' buying prices in the Michigan upper peninsula markets must be in close alignment with buying prices in Wisconsin markets. This, then, suggests that the more distant a market is from the surplus-production region the

Table 15. Estimated average annual value to bottlers of obtaining milk from the local cooperative, 1963.[a]

Market	Cents per hundredweight
Burlington	23.0
Waterloo	18.5
Cedar Rapids	12.5
Des Moines	27.0
Omaha	31.0
Moline	13.0
Mason City	24.5
Sioux City	46.0
Chicago	22.0
Detroit	42.0

[a] Source: U. S. Dept. Agr. Federal milk order market statistics, annual summary for 1963. U. S. Dept. Agr. Stat. Bul. 345. 1964.

[6] The transportation cost function presented by Butz (6) was used.

higher will be the value of obtaining milk from the local cooperative as estimated in table 15.

There would seem to be several other reasons for such wide differentials. Sanitary requirements for milk production are not universally the same, and a price adjustment may be necessary in some markets to reflect the different costs associated with meeting these different sanitary requirements. The transportation cost function used in this analysis is an average. Bottlers in some markets may be willing to pay a higher price for the privilege of securing locally produced milk for local consumption—presumably for advertising purposes. Some bottlers may be willing to pay a higher price for locally produced milk, because a local cooperative is a more dependable source of supply than others in case of bad weather. Some cooperatives have such a large volume that their milk could not be replaced from alternative sources either at the same or at a lower price.

Milk bottlers are required to pay members of the cooperative (and nonmembers as well) a price at least as high as the federal-order minimum price. However, if the cooperative considers this minimum price too low, it may present evidence in a federal-order hearing, justifying its claim for a higher minimum price. In the same hearing, bottlers may present evidence showing why the cooperative's claim is unjustified. The Office of the Secretary of Agriculture weighs the evidence and reaches a decision, much the same as does an arbitrator in labor disputes.

Hence, the cooperative may have an opportunity in the hearing to obtain a price which will cover the value of services provided bottlers; i.e., bargaining may take place in the federal-order hearing in the presence of a third party rather than around the baragining table. If the cooperative is successful in obtaining such a price, one may expect the excess of the average annual federal-order minimum class I price in the market over (a) the average annual bottlers' buying price for fluid milk in Eau Claire and (b) the cost of transporting milk from Eau Claire to the given market to be at least as large as this cooperative's estimate of the value of services provided bottlers. Or equivalently, one may expect the values recorded in table 15, less the negotiated premium on class I milk, to be at least as large as the value of services provided. This was true for five of the markets listed in table 15.

The following statistical model was estimated:

$$(16)\quad X_{3i} = \alpha_1 + \beta_4 X_{4i} + \beta_5 X_{5i} + \beta_6 X_{6i} + \beta_7 X_{7i} + \epsilon_i$$

where X_{3i} = estimated 1963 average annual value to cooperative i's bottlers of obtaining milk from cooperative i (cents per hundredweight), from table 15,

X_{4i} = 1, if for cooperative i, X_{3i} less the negotiated premium on class I milk equalled or exceeded the value of services provided bottlers in 1963 in table 14,

= 0 otherwise,

X_{5i} = cooperative i's estimate of the value of services provided bottlers (cents per hundredweight),

X_{6i} = coöperative i's distance from Eau Claire, Wisconsin,

X_{7i} = percentage of cooperative i's volume replaceable from alternative sources and

ϵ_i = an independently and normally distributed random variable with mean zero and variance σ^2.

Least-squares estimates of the parameters of equation 16 yielded values for a_1 and b_7 which were insignificantly different from zero at the 20-percent confidence level. Consequently, the parameters were reestimated on the assumption that $\alpha_1 = \beta_7 = 0$. The following estimates, all significantly different from zero at the 5-percent level, were obtained (standard errors of the estimates are shown in parentheses following each estimate):

$b_4 = 10.9826\ (2.3394)$
$b_5 = 0.5572\ (0.1688)$
$b_6 = 0.0348\ (0.0105)$
$R^2 = 0.9844$

Multiplying each b_j ($j = 4, 5, 6$) and its standard error by the ratio of the standard error of X_j to the standard error of X_3 yields estimates of b_{js} independent of the units of measurement, which indicate the relative importance of one independent variable over the other two in the determination of X_3.[7] These estimates are:

$b_{4s} = 0.5196\ (0.1107)$
$b_{5s} = 0.5162\ (0.1564)$
$b_{6s} = 0.3852\ (0.1160)$

Snedecor's F for testing the hypothesis that $b_{4s} = b_{5s} = b_{6s} = 0.5196$ and that $b_{4s} = b_{5s} = b_{6s} = 0.3852$ is 3.31 and 3.46, respectively. Thus, both hypotheses must be accepted at the 5-percent confidence level, and we conclude that the three factors are of approximately equal importance in the determination of X_3.

Differences in the elasticity of demand for fluid milk in the various markets may account for some of the variation in the results recorded in table 15. If the federal-order minimum price for class I milk adequately reflects the difference in milk-production costs between the several markets, the values in table 15 may be expected to be higher for cooperatives in markets where the demand for producer milk for fluid use is less elastic.

Demand functions were estimated for those markets in table 15 for which time-series data were available by using the statistical model,

$$(17)\quad Q_{it} = \alpha_i + \beta_i P_{it} + \gamma_i Y_{it} + \epsilon_{it}$$

where P_{it} = retail price of whole milk in market i and year t in cents per paper quart for the

[7] Such estimates are called "beta" or "standardized" regression coefficients.

most common grade sold out of stores (33),

Q_{it} = per-capita consumption of fluid milk and fluid-milk products in market i and year t in pounds of 3.5-percent producer milk equivalent (32, 33),

Y_{it} = per-capita income in market i and year t in dollars (26) and

ϵ_{it} = a normally and independently distributed random error with mean zero and variance σ_i^2

Demand functions were estimated with consumption as the dependent variable on the assumption that retail price and per-capita income are predetermined and that errors in the retail demand equation are independent of errors in the retail supply equation for each market. It was assumed that the retail price per quart for whole milk adequately reflects the retail value of all fluid milk products. Statistics obtained from the indicated regressions are recorded in table 16. Since only the b's for Chicago and Detroit are significantly different from zero at the 5-percent level, only the first two equations in table 16 will be used in the following analysis.

It is assumed that a 10-percent retail markup for fluid milk and fluid-milk products is typical (see 5, p. 44; 17). The share of the market for a typical firm is assumed equal to the ratio of total producer milk used for class I purposes per regulated bottler in the federal order to the per-capita consumption of all fluid-milk products (pounds of 3.5-percent producer milk equivalent).

The 1963 share of the market so calculated for a typical Chicago bottler was 103,227 persons and, for a typical southern Michigan bottler, 46,015 persons (31,33). On the basis of these assumptions, we get the following fluid-milk demand functions facing typical bottlers in the two markets:

Table 16. Selected statistics from regression estimates of demand for fluid milk and fluid-milk products.[a]

Market i	a_i	b_i	c_i	R^2	d^b
Chicago	573.8284 (29.0762)	−7.6043 (2.2923)	−0.0195 (0.0212)	0.8940	1.00
Detroit	590.3142 (45.8466)	−9.6747 (1.8713)	−0.0071 (0.0301)	0.8914	1.26
Quad Cities	450.0986 (65.2552)	−0.2966 (5.7674)	−0.0505 (0.0490)	0.5321	1.71
Sioux City	553.4959 (67.2360)	−4.3442 (4.6732)	−0.0675 (0.0353)	0.7058	1.74
Omaha	431.8461 (73.1027)	−1.6435 (5.3460)	−0.0281 (0.0389)	0.4024	2.14

[a] Standard errors of the estimated coefficients are shown in parentheses.

[b] The Durbin-Watson "d" statistic. Although the Durbin-Watson tables do not extend below 15 observations, extrapolation indicates that a "d" as low as 1.00 or 1.26 for 10 observations is an inconclusive test for positive autocorrelation.

(18) $Q_i = 59{,}234{,}584 - 872{,}245.56\ P_{wi} - 2012.9\ Y_i$ for i = Chicago,

(19) $Q_i = 27{,}163{,}308 - 494{,}641.11\ P_{wi} - 326.7\ Y_i$ for i = Detroit,

where $P_{wi} = 0.9\ P_i$ = wholesale price per quart. Evaluating these two equations at 1963 levels of prices and incomes yields price elasticities of demand of −0.75 for Detroit and −0.56 for Chicago.

This implies that the typical bottler in Chicago and Detroit sells all his milk to retail outlets. If all his milk is sold directly to homes, his demand curve would be the retail demand function from which equation 18 or 19 was derived. The elasticity of demand at the 1963 price and consumer income would be unchanged for each market since we have assumed a constant percentage retail markup. Bottlers will ordinarily sell milk directly to homes and to retail outlets. We assume that the cost of delivering milk to homes is equal to the retail markup; thus, only one demand curve need be shown for each handler.

To derive the demand curve for class I milk facing the cooperatives, the spread between wholesale and cooperative price must be deducted from P_{wi}. Assuming this spread to be 12.85 cents per quart for the typical Chicago bottler and 12.35 cents per quart for the typical Detroit bottler (31, 33) and constant, the elasticity of derived demand for class I milk at the 1963 level of per-capita income and cooperative price is −0.23 for the Chicago cooperative and −0.35 for the Detroit cooperative. Analogous elasticities in Quad Cities, Omaha and Sioux City may be taken to be zero since the b's for these markets were insignificantly different from zero.

Since these cooperatives are operating on the inelastic portions of their respective demand curves for Class I milk, they could increase their net profits (if cooperative marginal costs are not negative) by selling a lower total volume of class I milk for a higher price to their bottlers. These cooperatives could dump some milk and still secure for members a higher net return for milk than members are presently getting. Presumably, however, there would be outlets other than class I available for this extra milk.

Although not every bottler has facilities for processing surplus milk, we will assume for illustrative purposes that the typical bottler in Chicago and Detroit does have such facilities. If so, the cooperative may find it profitable to encourage this bottler to use less class I milk and more surplus milk. This can be shown by an application of the price discrimination model.

Expressing in terms of price the 1963 demand functions derived from equations 18 and 19, we obtain

(20) $P_{1i} = 48.69 - 0.00000115\ Q_{1i}$ for i = Chicago

and

(21) $P_{1i} = 40.98 - 0.00000202\ Q_{1i}$ for i = Detroit

where P_{1i} = farm price of class I milk on a per-quart basis and Q_{1i} = pounds of class I milk. Also, if we take the elasticity of derived demand for surplus milk to be –0.6 in both markets (5), the farm price of surplus milk on a per-quart basis in 1963 to be 6.7 cents in both markets—the average 1963 federal-order minimum price for milk used for manufacturing purposes (31) converted to a per-quart basis—and the quantity of surplus milk purchased by the typical Chicago bottler in 1963 to be 51,380,900 pounds and by the typical Detroit bottler in 1963 to be 10,830,000 pounds—the quantity of surplus milk purchased by regulated bottlers in the respective federal-order markets per regulated handler, see (31)—the following derived demand functions for surplus milk are obtained:

(22) $P_{2i} = 17.87 - 0.00000021\ Q_{2i}$ for i = Chicago

(23) $P_{2i} = 17.87 - 0.00000103\ Q_{2i}$ for i = Detroit

where P_{2i} = farm price of surplus milk on a per-quart basis and Q_{2i} = pounds of surplus milk.[8] Finally, we assume the typical bottler in Chicago purchased 84,826,600 total pounds of milk and the typical bottler in Detroit purchased 25,922,800 total pounds of milk in 1963 (total producer milk purchased by regulated bottlers in the two markets per regulated bottler, see 31).

Under these conditions, it can be verified by substitution into the first- and second-order conditions of the price discrimination model that cooperative profits would have been maximized if Q_{1i} = 24,797,794 and Q_{2i} = 60,028,806 for i = Chicago and Q_{1i} = 12,542,623 and Q_{2i} = 13,380,177 for i = Detroit. In comparison with profits made from the sale of class I milk at the 1963 bottlers' buying price for class I milk and the sale of surplus milk at the 1963 federal-order minimum price for surplus milk, the Chicago cooperative's profits would have been 0.89 cents per quart higher, and the Detroit cooperative's profits would have been 0.33 cents per quart higher. Thus, both cooperatives would have increased their profits had they been able to raise class I price and lower class II price. The class I utilization percentage for the typical Chicago bottler at the profit-maximization solution is approximately 30 percent; the corresponding figure for the typical Detroit bottler is 50 percent. Actual 1963 class I utilization ratios were about 40 percent in Chicago and 60 percent in Detroit.

Since the typical bottler in Chicago and Detroit seems to be operating on the inelastic portion of his demand curve, he will be able to increase his net profits by operating at a lower volume and selling this volume for a higher price. This may help to explain why bottlers tolerate superpool operations in Chicago and Detroit.

The analysis outlined here could be refined by determining the actual cost functions of milk bottlers and cooperatives and the demand function for surplus milk in each market. The elasticity of derived demand of –0.6 for surplus milk is an average of Brandow's estimates of elasticity of farm level demand for milk for use in cheese and butter. In individual markets, demand would be more elastic; i.e., less than –0.6. The assumption of a more elastic demand for class II milk would yield different derived demand functions for class II milk. The optimal solutions from the price discrimination model would then call for larger Q_{2i} and smaller Q_{1i} than in the solutions given.

Type II Bargaining Power

Attitude toward striking

Most of the cooperatives studied showed little interest in calling a milk strike under 1963-64 conditions. Seven of the 10 managers stated that they would not call a milk strike under 1963-64 conditions to obtain a higher price for milk. Three of these seven implied that they would withhold milk from bottlers only if one or more bottlers became so antagonistic toward the cooperative that the cooperative preferred not to conduct any business wth them. The principal reason given by these seven managers was the presence of too much surplus milk available to bottlers which would replace any milk withheld by the local cooperative. The managers expressed fear that their cooperative would permanently lose an outlet for its milk.

Other reasons given for not calling a milk strike were: (a) The cooperative and handlers have already agreed upon a reasonable price through the federal order. (b) A strike could bring on a lawsuit. (c) It is against the cooperative's policy to call a milk strike.

All seven cooperatives expressing reluctance at calling a milk strike under 1963-64 conditions were relatively small. The total volume of each could easily be replaced by alternative sources of milk in Wisconsin and Minnesota. Two of the three cooperatives who would call a milk strike (Chicago and Detroit) on the other hand, had volumes in 1963 of nearly 3 billion pounds—a volume which could not easily be replaced. Finally, the three cooperatives who would call a milk strike under 1963-64 conditions had an outlet for much or all of their milk supply in their own processing plants should they decide to withhold milk. The other seven cooperatives had no processing facilities or had facilities for handling only a small part of the cooperatives' total milk supply.

Two of the three cooperative managers indicating that they would call a milk strike under 1963-64 conditions stated that they would prefer to withhold milk from one or a few of their bottlers rather than from all bottlers. One of the reasons for this preference was that the cooperative could then use the whipsaw technique in negotiations. Gains acquired from this one bottler or small group could be used as leverage in negotiations with other bottlers. Further, there was some reluctance to withhold milk from all bottlers because it would have to be diverted to lower-valued uses. (It was universally

[8] That is, we are assuming that we know the price and quantity associated with a point on the linear demand function at which the elasticity of demand equals -0.6.

thought that members would not consent to dumping milk.) The third manager, however, indicated a preference for withholding milk from all bottlers since it would be much more difficult for all bottlers to find an alternative source of milk than it would be for one.

Two important factors, then, determining whether or not a cooperative will strike are (a) where the alternative sources of milk are located, the cost to handlers of securing this milk and the probability that the cooperative's handlers will be able to secure sufficient milk from these sources to replace the milk being withheld and (b) what the cooperative would do with the milk. Other factors suggested by the managers included (c) whether the handler is a small independent firm or a national chain, (d) whether the resulting public reaction, if any, would be favorable or unfavorable to the cooperative, possibility of pressure from newspaper editorials and city officials, and what legal repercussions are likely to result, (e) whether the economic conditions justify the cooperative's demand and (f) whether members will back the strike attempt. In determining how long the cooperative would withhold milk, the managers felt that they would have to consider the expected public and legislative reaction, expectations of success or failure, availability of alternative sources of milk and member support.

Cost of a strike

Member support depends on the expected loss and the length of time necessary to recover the strike losses. The losses accompanying a strike and the time necessary to recover these losses will vary from case to case.

Let us assume a cooperative located in a federal-order market to have an annual volume of 525 million pounds of 3.5-percent grade A milk and that

(a) its average weekly June volume is 11,250,000 pounds of 3.5-percent milk,
(b) its June class I utilization percentage is 65,
(c) the June federal-order prices are $3.96 and $3.02 per hundredweight for 3.5-percent class I and II milk and
(d) the seasonal variation in total volume and class I volume is the same as the 1962-63 seasonal variation in the Des Moines federal-order market (31).

Cooperative gross income in June would then be $408,487.50 per week.

If this cooperative decided to call a milk strike on all its handlers and the strike lasted throughout the first week in June and if it could find an alternative outlet for only 10 percent of its class I milk at a net price of $3.96 per hundredweight, the remaining portion of its sales going into alternative class II outlets at $3.02 per hundredweight, the cooperative's gross income in the first week of June would be reduced by $61,868. The cooperative would have recovered this amount by the end of the 16th week after the strike ended if a premium of 5 cents per hundredweight on class I milk over the federal-order class I price were negotiated and by the end of the 25th week if only a 3-cent premium on class I milk were negotiated. If the strike lasted 2 weeks, 29 weeks would be required to recover the lost gross income if a 5-cent premium were negotiated and 49 weeks if a 3-cent premium were negotiated.

As a result of a 1-week strike, assume that 10 percent of the cooperative's class I sales have been permanently lost and that this milk must go to class II outlets. Under these conditions, the cooperative would have had to negotiate a premium of 10.4 cents per hundredweight during June on class I milk to maintain the weekly gross income of $408,487. Depending on the class prices in future months, this premium may, of course, be insufficient to maintain this weekly income. Furthermore, it will not allow the cooperative to recover any of the income lost during the strike.

Assume that the cooperative also owns a butter-powder processing plant with a weekly capacity of 8,750,000 pounds of 3.5-percent milk. The average total cost function per hundredweight of milk for this plant is assumed to be equal to $72 - 0.3 X$, where $X =$ percentage of capacity, and the plant produces 1.125 pounds of butter per pound of butterfat and 8.6 pounds of nonfat dry milk per hundredweight of skimmilk. Combining these assumptions, the total returns to be distributed to members for the first week in June are $412,836.

If this cooperative called a milk strike and could find an alternative outlet for only 10 percent of its class I sales at a price of $3.96, the remaining volume going to its processing plant and to other class II outlets, total cooperative returns to be distributed to members for the first week in June would be $370,726.

The strike in this case would thus result in a reduction in the cooperative's net income per week of $42,111. The cooperative would have recovered the $42,111 by the end of the 12th week if a 5-cent premium on class I milk were negotiated and by the end of the 17th week if only a 3-cent premium on class I milk were negotiated. If the strike lasted 2 weeks, 20 weeks would be required to recover the lost net income if a 5-cent premium were negotiated and 34 weeks if a 3-cent premium were negotiated.

These results emphasize the possible cost of a strike to producer-members under various conditions. The cost is likely to be lower for members of a cooperative that has its own processing facilities.

These losses are substantial and may not be recovered before 6 months have elapsed, even if the cooperative is successful in negotiating a premium with handlers. If members lack the financial resources to withstand such losses, they are not likely to support the strike effort; thus, the cooperative might never recover the losses.

Legislation

All managers interviewed indicated that they participated in federal-order hearings. Various objectives were