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Procurement Policies and Practices of Dairy Manufacturing Plants in Eastern South Dakota

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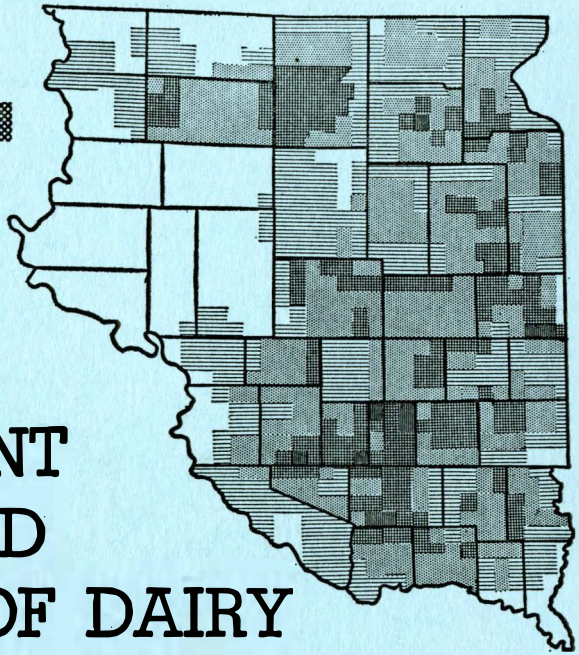

PROCUREMENT POLICIES AND PRACTICES OF DAIRY MANUFACTURING PLANTS IN EASTERN SOUTH DAKOTA

Part I. Market Structure and Behavior

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U. S. DEPARTMENT OF AGRICULTURE, COOPERATING

FOREWORD

This is the first of two reports concerning the results of a project entitled "A Study of Managerial Decision Making and Procurement Policies in Selected South Dakota Dairy Plants." The second report will be on managerial decision making. The study was conducted by South Dakota State College Agricultural Experiment Station under a Research and Marketing Act contract for the United States Department of Agriculture.

The authors are indebted to Dr. Louis F. Herrmann, of the United States Department of Agriculture, for help and guidance in organizing and conducting the study; to Dr. Ragnar L. Kristjanson, former Associate Economist at South Dakota State College, for encouragement and advice in organizing the study; and to Dr. Carl Wilson, former Associate Professor of Speech, South Dakota State College, for his able assistance in the survey of the literature and construction of the questionnaire.

CONTENTS

PROCUREMENT POLICIES and PRACTICES of DAIRY MANUFACTURING PLANTS

in eastern South Dakota

Part I. Market Structure and Behavior

By RALPH E. NELSON and TRAVIS W. MANNING[1]

INTRODUCTION

The procurement policies and practices of dairy manufacturing plants significantly influence the efficiency of the dairy marketing system. The strategic and tactical decisions of plant managers in policy formation and choice of practices are related to the competitive structure of the market. Market structure, then, affects market performance through its influence on managerial decisions. A better understanding of marketing structure and managerial decision making should contribute to the improvement of marketing efficiency.

The nature of competition--the market structure and market behavior--in milk and cream procurement by dairy manufacturing plants in Eastern South Dakota affects several groups. Producers have a vital interest in the way the dairy marketing system performs its functions, both in terms of operating and pricing efficiency. The processing and marketing costs affect the share of the consumer dollar that accrues to the producer. Consumers also have a vital interest in the way the dairy marketing system performs its functions. The price, choice, quality, and availability of dairy products are determined by the performance of the dairy marketing system.

The dairy marketing system in South Dakota has been undergoing rapid changes during the past three decades. The major changes are: (1) milk production has been declining and in 1959 was only 70.0% of milk production in the 1926-1930 period, (2) the disposition of milk by producers has been changing and, in 1958, 25.4% of all milk was marketed as whole milk as compared with 8.4% in 1950, (3) the number of dairy manufacturing plants has decreased from 137 in 1933 to 63 in 1958,

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and (4) the number of cream stations has decreased from approximately 1400 in 1933 to 219 in 1959. These changes portray a dynamic dairy marketing system in which new procurement methods are being tested and adopted. The decisions relative to procurement conduct of the plants were made within the structural framework of the market.

Nature of the Study

The working hypothesis of this study was that the structure of the market influences the conduct of the buyers and sellers in the market, which in turn influences the performance of the market. Economic theory suggests some elements of structure which affect conduct and performance. In addition to the elements suggested by theory, each market probably has its own peculiar characteristics that influence its behavior.

This study was concerned with the following questions:

1. What were the structural elements of the dairy marketing system in South Dakota?
2. What was the conduct of the buyers and sellers comprising the dairy marketing system in South Dakota?
   a. What was the extent of price competition?
   b. What was the extent and nature of quasi-price competition?
   c. What was the extent and nature of non-price competition?
   d. How rapidly was new technology adopted?
   e. What unfair procurement practices, if any, did the buyers feel existed?
3. What was the performance of the market?
   a. How efficient was the market in reflecting consumer wants?
   b. How efficient was the market in reflecting producers wants for services?
   c. How efficient was the marketing system in relation to known technology?
   d. How progressive was the market in the development of new technology?
4. What was the relationship between the structure of the market and (1) the conduct of buyers and sellers, and (2) the performance of the market?

Source of Data

This report is based on data collected from 60 dairy plants in 1957 and 1958, primarily through personal interviews of managers. All of the plants which procured manufacturing milk and cream directly from farmers and were located east of the Missouri River in South Dakota were included in the study. Information was obtained concerning the organizational structure of plants, products bought and sold, management characteristics, pricing policies and practices, procurement service policies and practices, financial conditions, and amounts of milk and cream handled. Complete information was obtained in most but not all cases.

DESCRIPTION OF THE MARKET

The term "market", like many other terms used in economics, is

applied to several concepts. The concept which seems most relevant to this study concerns price formation and the forces which interact to determine prices. The following definition seems suitable for the purposes of this study: **A market is a sphere in which the forces of supply and demand interact and the terms of trade are established for a product and its substitutes.** "Sphere" is used in a general sense and includes the full range of supply and demand forces influencing the terms of trade. The "terms of trade" include price and other considerations of value that are involved in a transaction. A "product" denotes a goods or service produced and sold by a single seller. The market, in its most complete sense, includes all stages in the marketing process from initial producer to final consumer; but to avoid undue complication, the market may be treated as a single stage in the marketing channel.[2]

Market Delineation

An important but often neglected task in market structure analysis is the delineation of the sphere in which the forces of supply and demand interact and the terms of trade are established for a product and its substitutes. Markets have traditionally been identified along commodity or industry lines. Studies of industrial concentration have followed this approach and often have misinterpreted the nature of competition within a market because the substitutability between products classified in different "industries" has been ignored. The market for a product includes all of its relevant substitutes. A major task in delineating the market for a product is the identification of the relevant substitutes. All products are substitutes in some contexts. The relevant substitutes in the present context are those whose exchange may affect the supply of or demand for—thence, the relative terms of trade for--the product under consideration. Inasmuch as products and sellers are paired under the market definition used in this study, the identification of the seller group is made simultane-

[2]Most discussions of price formation and market relationships assume a simplified one- or two-stage marketing process. In the one-stage process the initial producer sells directly to the ultimate consumer. In the two-stage process an intermediary buys productive resources from the initial producer, combines them into finished products which it sells to the final consumer. Some discussions treat the two stages as separate markets—one a "factor" market, the other a "product" market. A three- or multiple-stage market is generally conceded to prevail in reality but it has not been adequately treated in many theoretical formulations. The discussions of three-stage markets often treat the stages separately, concentrating their attention upon the intermediate (or "industrial" market) stage. The treatment of vertical segments or stages as separate and independent markets poses some grave dangers and it is tantamount to an assumption of complete vertical integration. Separate theoretical treatment of factor, industrial, and product markets can be justified on the basis of avoiding hopeless complications, provided that the inter-relationships between stages are properly recognized. The danger of oversimplification lies chiefly in the empirical application of the theory.

ously with that of the group of substitutes. The buyer group, in turn, may be identified in terms of the demand functions for the product and its substitutes. The market for a product, then, includes all other products for which it is substitutable, all sellers who would be willing to sell the substitutes, and all buyers who would be willing to buy the product, within the relevant range of relative terms of trade. The **relevant range** may be defined in terms of "normal" or probable relative prices, services, and other terms involved in exchange.

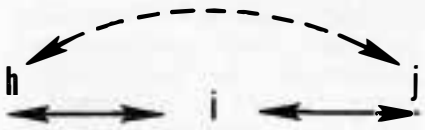
The substitutes for a given product may be identified by means of a *mutatis mutandis* cross demand function which may be called "cross influence" to avoid confusion with the more common *ceteris paribus* variety of cross demand.[3] This function measures the full range of substitution effects, including the indirect influences of spatially separated sellers. A *ceteris paribus* cross demand function reflects only direct influences. It does not measure the indirect influences which are relayed through chains and networks of spatially separated sellers. It implicity assumes either a point market in which all buyers and sellers have some mutual relationships or an areal market in which no price influences are relayed.[4]

The market group identified in terms of positive cross influence of demand schedules includes all direct and indirect rivals of a given seller and takes into account spatial separation of buyers and sellers which is a common characteristic. For example, sellers h and i may be direct rivals because of overlapping sales territories for substitute products. Likewise seller j may be a direct rival of i but not of h because their sales territories do not overlap. (Figure 1). A price cut by h may cause i to retaliate, thus reducing the demand for the product of j. Demand influences may be transmitted from h to j as readily as if they were direct rivals. Such chain relationships may form a network of overlapping and interlocking direct rivalry groups. Each seller in the network is a rival, direct or indirect, of every other seller. This system would be

[3]A price cross-demand function states the relation of the quantity demanded of the product of one seller to the price of the product of another seller, with all tastes, preferences, incomes, and technology remaining constant. The *mutatis mutandis* and *ceteris paribus* type functions differ in that the former assumes all other sellers to have adjusted fully to each price change while the latter assumes all other prices held constant.

The use of cross-demand and cross-supply functions in market delineation has been proposed by several writers including Papandreou and Wheeler (15, pp. 20-21), Cochrane (7, pp. 22-26), and Evans (8, pp. 11-13).

[4]It has been pointed out by Bishop that, "In oligopolistic cases, of course, neither of these (other prices or other quantities) *ceteris paribus* concepts is even approximately 'realistic', since oligopolistic interdependence implies that other firms typically *will* readjust their prices and quantities in response to a price-quantity move by the i^{th} firm," (2, p. 781). However, he did not pursue the implications of a *mutatis mutandis* cross-demand function because he was interested in market classification rather than market delineation.



h, i, and j Individual sellers
———— Direct rivalry (positive cross influence and positive cross demand)
- - - - - - - - - - Indirect rivalry (positive cross influence and no cross demand)

Figure 1.

identified as a single market group by cross influence whereas it would be identified as a number of overlapping market groups by a *ceteris paribus* cross demand. The latter cannot account for the demand influences which are transmitted from one rivalry group to another by sellers which are members of both. Consequently, it stops short of defining the market broadly enough to include all the forces interacting to determine the terms of trade.

The nature of cross influence of demand is as follows: If the cross-influence curve relating the products sold by two sellers is constant (a horizontal line) the two products are independent of each other and the sellers are not in the same market. If the curve is not horizontal the sellers are in the same market and are subject to common forces of demand. Their products are substitutes if the cross influence curve slopes generally upward and to the right and are complements if the curve slopes downward and to the right.

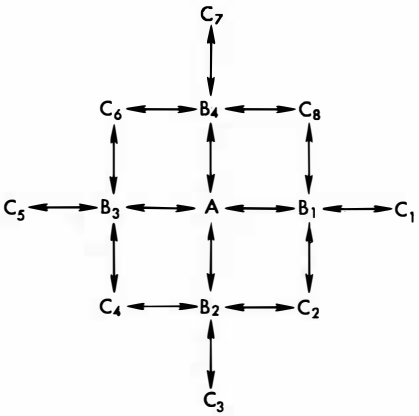
For cross influence of supply, the converse is true. If the cross influence of supply curve between plant A as a buyer and any other plant is non-constant they are in the same market group; and if it is sloping generally downward and to the right, their relationship is competitive.

The delineation of the market group of buyers can be accomplished by identifying substitutable products through the use of cross influence of supply. In using the cross influence concept it is necessary to select an anchor plant as a starting point.[5] Assume that plant A is the anchor plant and has four direct rivals - plants B_1, B_2, B_3, and B_4 (Figure 2). Each plant B has four direct rivals which includes plant A and three C plants. Further assume that: (1) the short run supply of milk is completely inelastic, (2) transfer costs are a simple linear function of distance, (3) the cross elasticity of supply between each plant and its direct rivals is -2.5, (4) the elasticity of supply to each plant is +10, (5) each plant attempts to maintain its volume of butterfat receipts, and (6) each plant has the same volume of

[5] The word "plant" was used instead of "firm" whenever reference was made to the dairy industry. This was done because (1) "plant" is more commonly used in the dairy industry when referring to a creamery or cheese factory, (2) this evades the controversy of whether a cooperative is a firm or only an extension of the farm firm, and (3) two plants in the study were owned by large corporations, so the word "plant" distinguishes the individual unit from the parent company.

butterfat receipts.

Suppose that Plant A increased its price by 10%. Each of Plant A's direct rivals (group B plants) would lose 25% of its volume to plant A and plant A's volume would double. Each B plant would act to maintain volume and would consequently adjust its purchase price upward by 2.5%. Each B plant would then regain 6.25% of its volume from plant A and also gain 18.75% from C plants. The four B plants would have now regained the volume they originally lost to plant A, plant A would have lost 25% of its initial volume gain, and eight C plants would have lost volume to B plants. Group C plants would now act to maintain volume. This adjustment-readjustment process would continue, as ripples and counter-ripples in a pool of water in which a pebble has been dropped, until a new equilibrium was reached for the entire market group. If plant A maintained its initial price change, the new equilibrium would find every plant adopting the same proportionate price change as plant A, each plant would have the same volume as the **status quo ante**, and the profit of each plant would be lower. The same response relationship would be valid if plant A had maintained price and increased its service. There would, however, be a greater time lag in response to a change in service as will be discussed later in this report.



Hypothetical Location of Dairy Manufacturing Plants
⟷ Cross Elasticity of supply

Figure 2.

The same response relationship would be valid using various assumptions about individual plant behavior. Plants may act to maintain volume as illustrated, maximize profit, match price or match service changes of any of their rivals, without affecting the nature of the conclusion. Only if the direct rivals made no response to the initial change (which is highly unlikely if the cross supply is negative) would the indirect rivals remain unaffected.

Each buyer in Figure 2 is a rival, direct or indirect, of every other buyer. All the buyers are in the same market group.

The market may be delineated by identifying all sellers and buyers of substitute products through the use of cross influence. This includes all the forces of supply and demand which interact to establish the terms of trade.

The use of cross influence could result in a rather heterogeneous

group of firms in the same market and make an analysis of competitive behavior very difficult. In empirical investigations, it may be necessary to obtain a relatively homogeneous grouping of firms in order to facilitate analysis and the drawing of generalizations with respect to the competitive behavior of the firms involved. Papandreou and Wheeler do this through the concept of an industry (15, p. 56). Cochrane found such a limitation useful in studying agricultural markets (7, pp. 21-39). An industry restriction would be less useful in other markets, such as the market for steel. It would seem preferable to limit the scope of inquiry by means of some minimum cross elasticity figure rather than some technical grounds which may be unrelated to the closeness of competitive relationships. Any restriction of the unit of study to a group smaller than the market results in an exclusion of some of the supply and demand forces. This exclusion may be offset, however, by a more detailed analysis and clearer picture of the role of the major forces. The use of an industry concept or any other restrictive technique depends on the nature of the market and the purpose of the study.

Delineating the Market For Manufacturing Milk and Cream

The market for manufacturing milk and cream can be delineated through the use of the cross influence of supply. Assume that plant A represents a dairy manufacturing plant buying milk and cream in South Dakota. The relevant question is whether plant A can affect the quantities offered for sale to other plants by raising its purchase price. The overlapping of procurement areas of dairy manufacturing plants in South Dakota indicated that contiguous plants would have negative cross influences of supply (Figure 3). In many local areas as many as four plants procured milk or cream. Figure 3 shows the procurement areas of 58 of the 60 dairy manufacturing plants in Eastern South Dakota. It does not show the procurement areas of (1) over 200 cream buying stations, (2) plants in the surrounding states, and (3) two large centralizers in other states which receive cream by truck and railway from South Dakota. There was no plant in South Dakota whose procurement area did not overlap at least one other plant. This network probably encompasses most, if not all, plants in the United States which buy milk and cream for manufacturing purposes. The network provides a mechanism within which a change in price or non-price policy by any South Dakota plant could reverberate until all the plants within the network had been affected. The plants within the network constitute the market group.

A second relevant question is whether the market group includes plants buying milk for fluid consumption. Would a change in the purchase price of manufacturing milk by plant A affect the quantity of fluid milk offered for sale to

plant Z? There are no restrictions against using fluid milk for manufacturing purposes but the higher cost of producing fluid milk generally precludes producing it specifically for the manufacturing milk market. Milk produced for fluid milk purposes commonly flows into the manufacturing milk market when its production exceeds consumption. The flow, however, is mainly the result of excess production rather than in response to a price change.

Health regulations generally prohibit the use of manufacturing milk for fluid consumption. However, some producers of manufacturing milk can meet grade A requirements and can shift to fluid milk whenever there is a buyer for it. Again the shift might not be in response to a change in price of either fluid milk or manufacturing milk. Considering the lack of short run substitution between fluid milk and manufacturing milk in response to a change in price of either one, it was concluded that cross influence between the two was negligible and the two products were in different markets. However, the relationships should be kept in mind and, for other studies with different purposes, it might be desirable to include them in the same market.

A third relevant question is whether buyers of other types of farm products fall in the same market group as plant A. Assuming a long run increasing supply curve for milk, farmers will, in the long run, divert labor and other resources into dairying from alternative enterprises which will affect

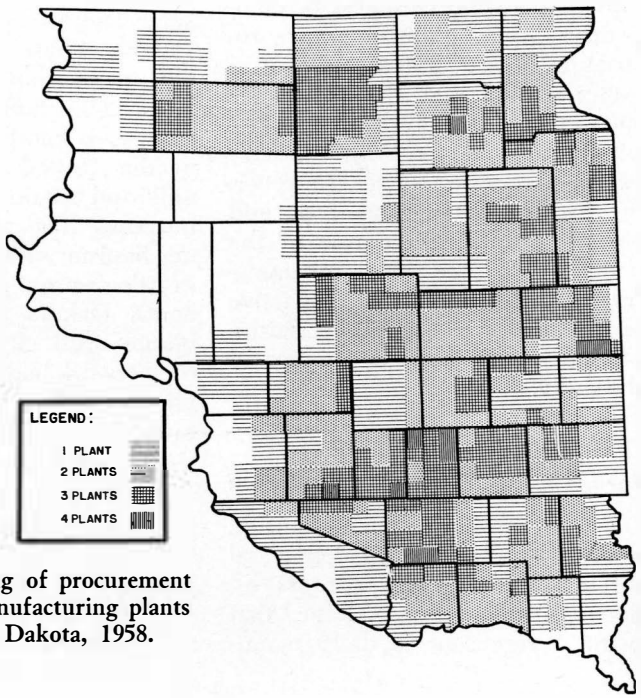


Figure 3. Overlapping of procurement areas of 58 dairy manufacturing plants in eastern South Dakota, 1958.

the quantity of other farm products available to firms purchasing these products. Consequently this gives plant A a generally downward sloping cross influence curve with buyers of other farm products. However, due to the adjustment lag, the degree of influence is definitely weaker than among plants buying manufacturing milk. Because of this gap, buyers of other farm products will not be included in the same market group as plants purchasing manufacturing milk.

The market group for plant A includes all plants in the United States purchasing milk or cream for manufacturing purposes. However, this study was limited to the 60 dairy manufacturing plants in Eastern South Dakota.

Demand Conditions

The demand for manufacturing milk and cream is derived from consumer demand for manufactured dairy products. A change in consumer demand for dairy products is transmitted to producers through the distribution system. The prices of dairy products affect the utilization of available milk at manufacturing plants. When a manufacturing plant has facilities to produce several dairy products, decisions to channel milk into particular dairy products are made at the plant according to the relative price of the various milk products. Producers also make decisions to market their product as milk or cream and in some areas producers can choose among creameries, cheese plants, condenseries, or fluid markets in response to changes in the relative price of dairy products.

The total per capita consumption of milk and milk products has been decreasing in the United States since 1940. Using the 1925-29 period as a base, the per capita consumption of milk and milk equivalent was 101.1% of the base average in 1940, 97.4% in 1945, 91.6% in 1950, and 86.3% in 1959.

In 1958, butter was the primary dairy product manufactured by 53 of the 60 plants in Eastern South Dakota and 88.2% of the butterfat used for manufacturing purposes in South Dakota was processed into butter. The consumption of butter, however, has been decreasing. The per capita consumption of butter decreased from 18.1 pounds in 1910 to 8 pounds in 1959 (Table 1).

Table 1. Per Capita Consumption of Butter for Selected Years, United States, 1910-60

Year	Pounds
1910	18.1
1920	14.6
1930	17.3
1940	16.7
1950	10.6
1959*	8.0
1960*	7.8

*Preliminary estimate.

The decreased consumption of butter has been the result of the general reduction in consumption of fat-type table spreads and the substitution of margarine for butter. The increased use of nonfat milk solids has partially offset the

decreased use of butter. However, about 50% of the total nonfat milk solids was utilized for human consumption in the 1920's and this had increased to 80% by 1957.

In general, the consumption of butter and fluid cream has been decreasing while the consumption of fluid milk, cheese, and nonfat dry milk has been increasing. This change in consumption patterns for dairy products should increase the competitive advantage of cheese plants and plants receiving whole milk at the expense of plants receiving only cream. Also, it is expected that the decline in the overall consumption of dairy products would discourage new plants from entering the market.

Supply Conditions

Dairying in South Dakota is concentrated largely in the eastern part of the state, with the greatest concentration in the extreme eastern counties; the Missouri River acts as a general dividing line between the dairy and non-dairy areas of the state. In 1957, 87.1% of South Dakota's milk production was east of the Missouri River. Milk production in eastern South Dakota has declined in total quantity and in 1958 reached only 70% of the 1926-30 average. This decrease in quantity has led to excess capacity of existing plants and probably to increased competition between plants for milk and cream. Excess plant capacity and increased competition tend to discourage entry of new plants in the area.

The dairy manufacturing plants in this study depended primarily on local producers for their supply of milk and cream. Six centralizers received cream from a large supply area through a network of cream stations but the remaining 54 plants bought all their milk and cream directly from local producers.

Farmers have been changing their methods of disposing of milk. The amount of milk used on the farm, the amount retailed by farmers, and the amount separated on the farm and sold as cream have been decreasing for many years (Table 2). These decreases have

Table 2. Percentage Distribution of Milk by Farmers in South Dakota and the United States by Selected Year, 1930—1958

Year	Used on farms		Retailed by farmers		Delivered to plants and dealers as whole milk		Delivered to plants and dealers as cream	
	S. D.	U. S.	S. D.	U. S.	S. D.	U. S.	S. D.	U. S.
	(Percent)							
1930	23.0	24.8	3.9	6.8	2.1	34.4	71.0	34.0
1935	24.9	25.7	3.8	6.9	2.2	35.2	69.1	32.2
1940	20.1	21.2	3.5	5.6	2.5	43.1	73.9	30.1
1945	18.5	17.9	2.7	4.7	5.6	57.5	73.2	19.9
1950	17.3	15.7	2.7	3.4	8.4	63.6	71.6	17.3
1955	14.3	12.0	1.2	2.2	14.3	73.7	70.2	12.1
1958	11.3	10.0	1.0	1.8	25.4	79.4	62.3	8.8

Source: *Agricultural Statistics,* U. S. Department of Agriculture, 1959, and *South Dakota Dairy Reporter,* S. D. Crop and Livestock Reporting Service, May 20, 1959.

been offset by an increase of milk marketed in whole form. This trend has been more pronounced and more advanced in the rest of the nation than in South Dakota. It has been in response to changing consumer demands which favor milk and solids-not-fat in milk at the expense of butter and cream, and government price support programs which have favored the sale of nonfat milk solids. This trend to whole milk marketing probably will continue and may be accelerated in South Dakota. This will have the effect of further decreasing the number and importance of cream stations, small creameries, and centralizers while enhancing the competitive advantage of plants receiving whole milk.

ANALYTICAL FRAMEWORK

The marketing of manufacturing milk and cream involves many complex relationships. An analytical framework is necessary for arranging these relationships in proper perspective for evaluation. Received value theory was drawn upon heavily for analytical tools and normative criteria. The analytical framework together with the theory on which it was based are presented here in order that the reader may make his own interpretations of the subsequent analyses and evaluations. Further, it is hoped that this formulation may be useful in other empirical studies.

Definition of Terms

Market Structure

The term "market structure" refers to the aggregate of market characteristics which influence the conduct of buyers and sellers in the market. Mason has stated that market structure "includes all those considerations which he takes into account in determining his business policies and practices" (13, p. 69). Sosnick uses "structure" to refer to "characteristics which constitute a market's patterns, status, and composition" (19, p. 386).

The term "market structure" is used here to mean the aggregate of those market characteristics which significantly influence the nature of buyer and seller conduct and the performance of the market. The market structure concept does not include everything that may influence conduct and performance. It is restricted to characteristics which are peculiar to a particular market and are related to the conduct of buyers and sellers with respect to the transaction process.

Market Behavior

Market behavior includes the conduct of the buyers and sellers in the market and the performance of the market. The conduct of buyers and sellers includes their marketing strategy, tactics, and practices. Conduct can also be defined as any action taken by a buyer or seller to maintain or improve his profit position via demand, supply, and cost functions. The five general categories of conduct are: (1) price practices, (2) quasi-price practices, (3) non-price practices, (4) unethical practices, and (5) adoption of technology. Price practices refer to maintaining or im-

proving one's profit position through price manipulation. Quasi-price practices differ from price practices only by degree. Included are practices such as absorption of hauling costs, and rebates or refunds that can readily be given a monetary value but are not a part of the explicit product price.

Non-price practices refer to personal, goodwill, locational, and product differentiation. By unethical practices is meant any practice considered unethical by the buyers and sellers in the market.[6]

The performance of a market includes the market results. Bain said that "Market performance refers to the composite of end results in the dimensions of price, output, production costs, selling cost, product design, and so forth..." (1, p. 11). Sosnick refers to performance as "dimensions which represent the realization of normatively significant 'economic' results" (19, p. 387). Criteria of performance are normative. The criteria selected for this study were that the marketing system should: (1) reflect consumer demand relative to quantity, quality and kind of goods produced, (2) reflect producer demand relative to services offered, (3) be efficient relative to known technology, and (4) be progressive in the development of new products and techniques of production.

Market Power

Market power is the ability of a seller or buyer to influence market behavior. There are two aspects of market power. The ability of one seller to affect the behavior of another seller (or buyer *vis-a-vis* another buyer) is called "power relations." The ability of a seller group to affect the market behavior of a buyer group (or vice versa) is called "balance of power."

Power relations among sellers or buyers may be classified as (1) isolated, (2) atomistic, (3) circular, (4) mixed, and (5) complex. Isolated power relations exist when there is only one seller in a given market. Atomistic power relations exist if no seller in a market group affects or is affected by the actions or reactions of the other sellers when making an output or selling policy decision. Circularity exists, between sellers, when either seller can affect the other's volume by changing price. Mixed power relations exist when there are both atomistic and circular relations within the same group or when there are assymetrical relationships such as "dominant-seller oligopoly." Complex power relations involve direct and indirect circularity. They are typical of spatially separated sellers or buyers of imperfectly substitutable products, that is, of spatial differentiation and "chain" competition.

The balance of power between buyer and the seller groups tends to favor the group with the more concentrated market power. It is related to the three general types of price determination: (1) price setting - if market power is unequally divided between buyers and sellers, the more powerful

[6]The buyers and sellers in the market will, hereafter, be referred to as the "market group."

group tends to set the terms of trade; (2) **price bargaining** - if market power is equally divided between the two groups, the terms of trade tend to be determined by either individual or collective bargaining; and (3) **price fixing** - if market power is extremely concentrated and the public interest involved, the terms of trade may be regulated by a governmental agency. Scitovsky has pointed out that "Trade at set prices is the most common form of market relations in our society" (18, p. 21).

Market Relationships

Structure and Behavior

Some economists feel that market structure at least influences and possibly determines the conduct and performance of a market. The classical models of perfect competition and monopoly both implied that market behavior was a function of market structure. A perfectly competitive structure was supposed to result in a perfectly efficient marketing system that equated supply and demand and transmitted consumers' tastes to producers through the price system, whereas monopolies were thought of as inimical to the ideal performance of the market. Schumpeter claimed that the classicists neglected the development of new technology as a performance norm and that perfect competition was incompatible with research and technological development. He further argued that innovation came from monopoly power (17, pp. 83-85).

The recognition of an area between perfect competition and monopoly has caused economists to re-evaluate the cause-and-effect relationship between structure and behavior. Firms in the area of imperfect competition are not the passive participants of the market that characterized the perfect competition model. When firms compete in small groups the action of each exerts a marked influence on the position of the others. Each firm adjusts itself to a given market structure but is also capable of changing that structure. Heflebower says that "the structure of a market at a given time reflects an evolutionary process whereby firms come to acquire a workable relationship with one another" (11, p. 124).

The structure of a market can reflect mistakes, conscious moves, or past conditions. Consequently, firms may be larger or smaller than conditions of supply or cost would warrant. The original structure of the dairy marketing system was influenced by attributes of the product such as perishability and bulkiness in relation to the level of technology at the time of development. These are now built into the structure.

Structure and Power

Market power, also, is related to market structure. In a perfectly competitive market the individual seller or buyer would have no market power while a monopolist or monopsonist facing many buyers or sellers would have a maximum

amount of market power. For all market structures between perfect competition and monopoly the market power of sellers and buyers is less clear cut.

Measurement of Market Power

Hypothetically, power relations among buyers can be determined through the use of cross influence of supply schedules. It is difficult, if not impossible, to collect data which can be substituted directly into a cross influence schedule. The concept, however, guides the investigator to other tools of measurement which may approximate the results obtained if data were available. The measuring tool used in this study to identify the direct rivals of each plant and to measure market power was to ask each plant manager the following question: Which plant or plants do you watch most closely in setting your prices? It was assumed that each plant manager watched the prices of his direct rivals.

The answers to this question did not give a complete picture of direct rivalry and market power because the answers did not include all competitive relationships. The question only referred to price competition and plants could and did compete on other bases. Also, the answers did not reveal dormant but potential competitive relationships. The modal number of plants that plant managers watched in setting prices was two. The modal size of the direct rivalry group, therefore, was three (Figure 4).

In addition to delineating the direct rivalry group for each plant, the answers to this question also revealed the number of plants which looked to each other for price information. This resulted in an index of market power for each plant. The index of market power was calculated by counting the number of plants which looked to a particular plant for price information.[7]

PROCUREMENT POLICIES AND PRACTICES (CONDUCT)

The objectives of the procurement policies of the 60 dairy manufacturing plants included in this study were to acquire a certain and regular supply of milk with desired quality attributes. The amount and quality of milk and cream received by each plant were determined by (1) the density of milk production in the plant's supply area, (2) the plant's procurement policy, and (3) the procurement policies of the plant's direct rivals. Under these conditions, an individual plant's volume and quality of purchase would be influenced by the management's choice of price, quasi-price, and non-price services offered to the producers.

Buying Strategies

Price

Price competition refers to that aspect of economic rivalry in which

[7]The data did not include plants in surrounding states which secured price information from South Dakota plants. The market power of some of the border plants probably was greater than this study indicated.

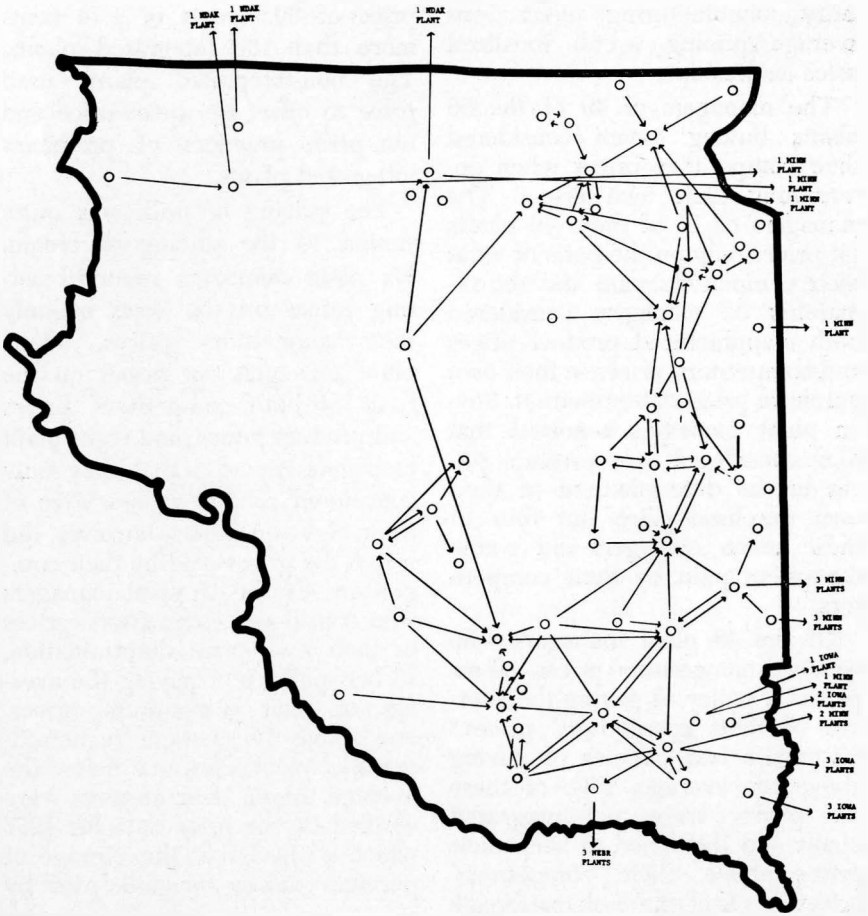


Figure 4. Sources of price information of 59 dairy manufacturing plants in eastern South Dakota, 1958. Arrows point to the plant from which price information was received.

two or more buyers seek given volume and quality objectives by means of the price paid for milk and cream at the time of purchase.[8] Dairy producers in South Dakota had, on the average, two or three outlets for their product. The market structure was characterized by relatively few buyers in each direct rivalry group and many sellers. The buyers were the price makers and this made necessary some type of pricing policy. The most common pricing policy of the

[8]Cash patronage refunds and absorption of hauling costs were considered as quasi-price competition. None of the plants allocated its reserves to patrons accounts.

dairy manufacturing plants was average pricing with localized price leadership.

The managers of 49 of the 56 plants buying cream considered their competitors' prices when determining their own prices. The managers of 17 of these 49 plants set prices only on the basis of what their competitors paid and the remaining 32 managers considered both manufactured product prices and competitors' prices in their own purchase price determination. Seven plant managers reported that they considered only product prices in the determination of their own purchase price but four of these seven managers did watch the prices paid by their competitors.

Of the 49 plant managers who watched competitors' prices, 39 reported a policy of paying the average of their competitors' prices.[9] Six plants had policies of paying above the average. Five of these six plants were non-integrated plants and they tried to keep their prices above their competitors' prices to offset the cash patronage refund paid by the producer-integrated plants.[10] Four plant managers reported policies of paying less than their competitors and all four were producer-integrated plants. These answers were verified by the average prices actually paid for cream during 1955, 1956, and 1957. The average price paid by the producer integrated plants at the time of purchase was 58.46 cents per pound of butterfat in cream whereas the non-integrated plants paid an average purchase price of 60.2 cents or 1.74 cents more than the integrated plants. The non-integrated plants used price to offset the quasi-price and non-price practices of producer-integrated plants.

The pricing of milk was quite similar to the pricing of cream. Six plant managers reported setting prices on the basis of only their competitors' prices, nine plant managers set prices on the basis of both competitors' prices and product prices, and eight plant managers reported that they only considered product prices. Five of these eight managers, however, did watch the prices paid by their competitors. Of the 15 plant managers who considered competitors' prices in their own price determination, 13 had policies of paying the average of their competitors' prices, one above the average, (a non-integrated plant), and one below the average. Again their answers were verified by the price data for 1957 which showed that the average of purchase prices for milk paid by

[9]It was not determined whether plants calculated a simple average, a weighed average, or paid the same price as their highest paying direct rival. This shortcoming does not, however, impair the usefulness of the results as they are used in this context.

[10]Dairy plants were classified into (1) producer integrated and (2) not producer integrated. They will be referred to as producer integrated and non-integrated plants. The distinguishing characteristic was that the producer integrated plants returned excess earnings to the producer on the basis of patronage while the non-integrated plants returned excess earnings to the stock owners.

the non-integrated plants was $2.90 per hundredweight while the average of prices paid by producer-integrated plants was $2.85. These findings agree with the Wisconsin study which found that "the most frequently stated price policy was that of average pricing. Out of 62 instances reported upon, 49 listed it" (5, p. 15).

The most common method of obtaining price information was by telephone. Forty-two plant managers found what other plants were paying by calling the plant managers. With the exception of distant centralizers and cases where plant managers could not get along with each other, the telephone was almost the exclusive method of keeping informed on prices. Prices of manufactured dairy products were quite stable so managers did not have to keep in daily touch with each other but telephoned their competitors only when a change in prices was considered.

Other price practices were more difficult to imitate than the basic price paid for butterfat in milk and cream. The practice of paying a premium for bulk milk could not be duplicated by plants not buying bulk milk. Ten plants bought bulk milk and nine of them paid a premium. The most common premium was 10 cents per hundredweight paid by six plants. Two plants paid 15 cents and one plant 5 cents per hundredweight. Some of the managers admitted that these premiums were not justified on the basis of present savings in costs but felt they would be justified when all the milk was received by bulk. The premium was explicitly thought of as an encouragement toward an all-bulk operation. None of the managers mentioned it as a competitive tool to attract producers from other plants. Many managers, however, reported going into bulk because they were losing their best patrons to other plants which were in bulk.

Price at the time of purchase was generally not utilized as a strategic device for increasing volume of dairy processing plants in eastern South Dakota. The greater efficiency of large producer-integrated plants over smaller non-integrated type plants was not passed on to producers in the form of a higher purchase price for butterfat but rather in the form of absorption of hauling costs and patronage refunds. Non-integrated plants paid a higher average purchase price than producer-integrated plants but this was a constant differential used to offset the patronage refund paid at the end of the year by producer-integrated plants. This conclusion is in accord with the findings of a similar study in Wisconsin which stated that "a much more significant development was the expression of the idea that among certain firms competition was allowed to take only certain forms if it were to be socially acceptable. Among these firms a plant manager might occasionally resort to price competition, but a good neighbor would not. In several instances there was evidence that the plants around here are pretty good neighbors" (5, p. 17).

The findings of this study and

the Wisconsin study are in agreement with economic theory on pricing. Galbraith says, "Most important, where the number of firms is small, a characteristic feature of modern industry, interdependence is recognized and respected, and firms stoutly avoid price behavior which would enhance uncertainty for all" (10, pp. 100-101). Fellner observed in his *Competition Among the Few* that oligopolistic firms generally live in a state of quasi-agreement and the agreement is usually confined to prices and not to other methods of competitive behavior (9, p. 182).

The small number of plants in each direct rivalry group leads to circular power relations and interdependence of price policy. The circular power relations within each direct rivalry group minimizes purchase price as a competitive weapon. The interlocking of direct rivalry groups encompasses the entire market and renders unstable any plan among firms to lower purchase prices collusively. The local price leader does not possess sufficient market power to effectuate lower purchase price but rather acts as a reflector of market conditions.

The inability of plants, with circular power relations, to use price effectively as a competitive weapon and the difficulty of collusion among all the plants in the market enhances the value of quasi-price and non-price tactics as competitive weapons.

Quasi-price

Quasi-price practices included plant absorption of hauling costs and payment of patronage refunds. Thirty-nine of the 56 plants buying cream had truck assembly service for their patrons. This included 31 of the 34 producer-integrated plants and eight of the 22 non-integrated plants. Thirty-six of the 39 plants paid all the hauling costs, two plants shared the hauling costs with the producer, while only one plant absorbed none of the hauling cost. Most of the plants did not have accurate assembly cost figures so they were asked to estimate these costs. The most common estimate of hauling costs was three cents per pound of butterfat, the lowest estimate was 2 cents and the highest was 5 cents. The average estimated hauling cost per pound of butterfat assembled by truck was 3.27 cents. This average was weighed according to the volume of butterfat receipts of each plant.

The relative burden of absorbing hauling costs was greater for the larger plants than for the smaller plants because the larger

Table 3. Average Absorption of Hauling Costs of Cream by Volume of Receipts for 51 Dairy Manufacturing Plants in Eastern South Dakota, 1958*

Volume of receipts	No. of plants	Absorption of haulingcosts
Lbs. of butterfat		Cents per lb. of butterfat in cream
Less than 250,000	25	1.44
250,000-499,999	13	1.95
500,000-999,999	10	3.02
1,000,000 and over	3	2.80

*The centralizers were omitted from this classification because they did not receive cream directly from producers.

plants received a greater proportion of their cream through truck assembly (Table 3). The 38 plants which received less than 500,000 pounds of butterfat had an average hauling cost absorption of 1.62 cents and the 13 plants which received 500,000 pounds of butterfat and over had an average absorption of 2.97 cents per pound of butterfat in cream.

Absorption of hauling costs was relatively uncommon in the purchase of milk. Three plants out of 22 absorbed the entire hauling cost, five plants shared the cost with the producer. The eight plants absorbed, on the average, 24.2% of the cost. The other 14 plants did not pay any of the hauling cost.

One of the nine plants receiving bulk milk for manufacturing purposes absorbed the hauling cost of bulk assembly. The other eight did not pay any of the assembly costs.

Cash patronage refunds constituted another type of quasi-price practice. Refunds were paid in one or more of the three years studied (1955, 1956, and 1957) by 26 of the 34 producer-integrated plants buying butterfat in cream. The highest average refund for the three years was 6.3 cents per pound of butterfat in cream and the average refund paid, for the three years by the 26 plants, was 3.65 cents.

The savings from the greater efficiency of the large producer-integrated plants were generally passed on to the patron in the form of a refund. The nine producer-integrated plants which received less than 250,000 pounds of butterfat a year paid an average refund of 1.52 cents per pound of butterfat in cream and the three producer-integrated plants that received over 1,000,000 pounds paid an average annual refund of 5.49 cents (Table 4).

Eight plants receiving milk paid a refund in 1957. The refunds ranged from 4.5 cents to 21 cents per hundredweight of milk and the average of the eight plants was 12.1 cents per hundredweight.

Table 4. Average Refund by Volume of Receipts for 33 Producer-Integrated Dairy Manufacturing Plants in Eastern South Dakota, 1955-57*

Receipts, volume	Plants, number	Refund, average
Lbs. of butter		Cents per lb. of butterfat
Less than 250,000	9	1.52
250,000-499,999	12	2.98
500,000-999,999	9	3.23
1,000,000 and over	3	5.49

*One plant was excluded from these figures because the greater part of its cream was purchased from cream stations rather than directly from producers.

Four plant managers reported that the payment of patronage refunds by their rivals was the procurement practice which gave them the most trouble. Many of the plants usually paid their annual refunds in December and the farmers tended to rely on this source of income for Christmas shopping. In such cases, producers may tend to overvalue rather than discount patronage refunds.

Non-Price

Non-price practices include auxiliary services and other procure-

ment practices not classified as price or quasi-price practices. Insofar as these factors, whether real or fancied, vary from plant to plant, the plants are differentiated in the eyes of the sellers and they develop preferences among the various plants. These preferences reduce producers' responses to price and quasi-price practices.

Fifty-three of the 56 plants furnished cans to cream patrons. Twenty-seven of these plants did not charge for the cans (Table 5).

Table 5. Classification of 53 Dairy Manufacturing Plants in Eastern South Dakota by Method of Pricing Cream Cans to Patrons, 1958

Method of pricing	Number of plants
No charge	27
At cost	17
Cost plus a markup	7
Plant buys every other can	2
Total	53

The practice of providing free cans to patrons was not as prevalent for milk and only seven of the 22 plants buying manufacturing milk used this practice (Table 6). The

Table 6. Classification of 22 Dairy Manufacturing Plants in Eastern South Dakota by Method of Pricing Milk Cans to Patrons, 1958

Method of pricing	Number of plants
No charge	7
At cost	6
Cost plus a markup	2
Plant buys every other can	2
Plant rents cans to patrons	5
Total	22

managers were not questioned as to the cost of this service but an estimate of four cents per hundredweight of milk was made on the basis of cost data from four Wisconsin plants (6, pp. 25-26).

Twenty-seven of the 56 plants buying cream paid all the cost of retinning cream cans, 26 plants did not pay any of the cost, two plants paid one-half of the cost and one plant paid the cost if the patron could talk the manager into it.

Forty-two of the 59 plants sold dairy supplies at the plant: 13 sold these supplies at cost while 29 plants sold at cost plus a markup. Other supplies such as feed and fertilizer were sold by 22 plants and all of these plants sold at cost plus a markup. These supplies may be handled as a service to the patron or as a means to increase the plant's profit. It is reasonable to assume, however, that a patron would be a more loyal cream or milk supplier if he also purchased his feed, fertilizer, or dairy supplies at the same plant.

Furnishing buttermilk or whey to the patrons was a common practice. Forty-four of the 56 plants manufacturing butter furnished buttermilk to patrons but only three plants did not charge for it. The other 41 plants charged a nominal price. Three of the five plants manufacturing cheese furnished whey to the patrons and all three plants gave it away.

The managers of 41 of the 42 plants that provided assembly service reported that their haulers advised the patrons on quality problems and the haulers of 17 plants

advised the patrons on production problems. The haulers of all 42 plants delivered dairy or farm supplies to patrons and four plant managers reported that their haulers would deliver groceries to patrons on special request.

A more significant, but less common practice, was the making of loans to patrons. Eight plants made direct loans to patrons. Five of these lent for the purpose of purchasing can coolers for milk. They deducted the payments from the milk checks. This seemed to be a method of converting cream patrons to milk patrons.

Cosigning notes for patrons and taking the payments out of the cream or milk check was a competitive practice of nine plants. The larger producer-integrated plants were more prone to utilize this practice as four of the seven producer-integrated plants handling milk cosigned notes for the purchase of bulk tanks and two other producer-integrated plants cosigned notes for can coolers. Two nonintegrated plants engaged in this competitive practice.

Loaning money to patrons or cosigning a patron's promissory note was an effective method of holding a patron and rendering the patron less sensitive to price or service differentiation. A similar practice, which has been started by two or three plants since this study was completed, is a lease arrangement for bulk tanks. The lease arrangement has the same effect as a marketing agreement with a single plant and probably binds the patrons closer to a given plant than does a cosigned note.

Only two plants in southeast South Dakota maintained contact with the patrons through a newsletter. The Wisconsin study found that this was a common competitive device, but the plants included in that study were much larger (5, p. 32). A plant newsletter probably becomes more important as a competitive tool when plants become larger and the relationships between the plant management and the patrons becomes more impersonal.

Six plants offered group insurance plans for patrons. Five of these six were milk receiving plants.

The same services tend to be adopted by contiguous plants. The practice of furnishing free cream cans to patrons was followed by

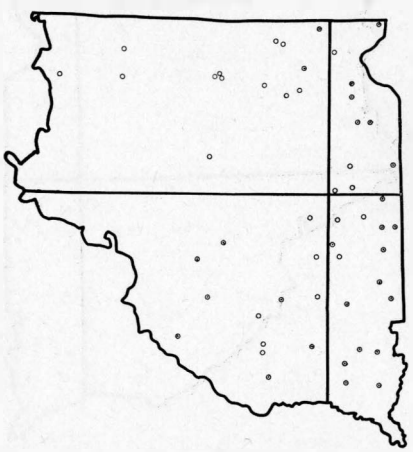


Figure 5. Location of dairy manufacturing plants in eastern South Dakota according to method of pricing cream cans to patrons, 1958. Circle with dots in center indicates free cream cans; plain circle indicates other method of pricing cream cans.

81.2% of the plants in the southeast part of the area while only 16.7% of the plants in the northwest section of the area followed this practice (Figure 5). If the area was divided into an eastern and a western section, it was found that 73.1% of the plants in the eastern section and 36.0% of the plants in the western section furnished free cream cans to patrons. The practice of retinning patrons' cream cans without charge was also most common in the southeast district where 75.0% of the plants provided this service to patrons (Figure 6). This service was provided by 65.5% of the plants in the southern section and by 29.1% of the plants in the northern section of the area.

The practice of furnishing and retinning milk cans to the patron without charge was concentrated

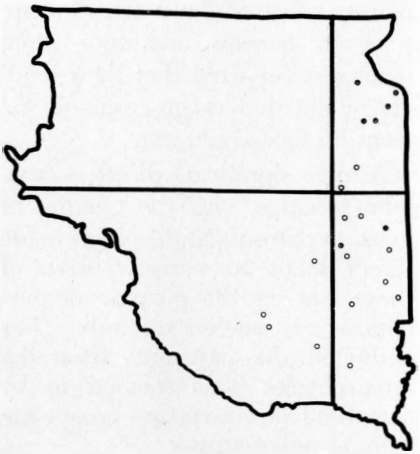


Figure 7. Location of dairy manufacturing plants in eastern South Dakota according to method of pricing milk cans to patrons, 1958. Circle with dot in center indicates free milk cans; plain circle, other method of pricing milk cans.

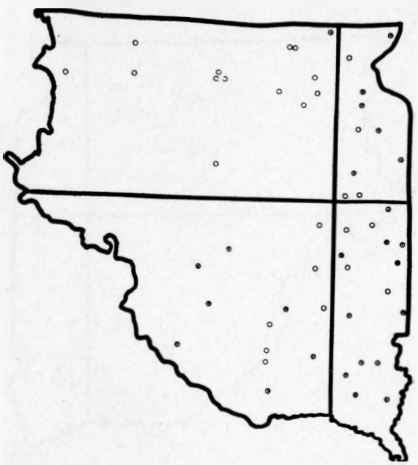


Figure 6. Location of dairy manufacturing plants in eastern South Dakota according to method of pricing retinning of cream cans to patrons, 1958. Circle with dot in center indicates free retinning of cream cans; plain circle indicates charge for retinning.

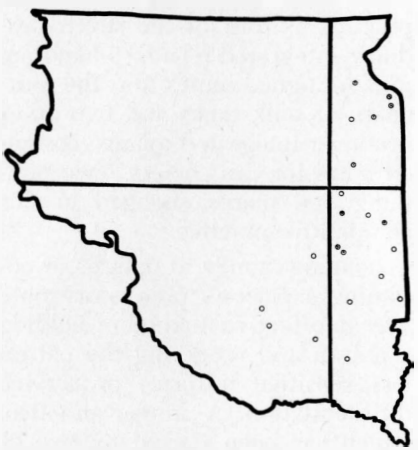


Figure 8. Location of dairy manufacturing plants in eastern South Dakota according to method of pricing retinning of milk cans to patrons, 1958. Circle with dot in center indicates free retinning of milk cans; plain circle indicates charge for retinning of milk cans.

in the northeast section of the state. (Figures 7 and 8). Two cheese manufacturing plants in this area have provided this service so when the neighboring butter manufacturing plants started receiving milk they also adopted these two services. The practice has not, however, spread beyond this area.

Some services offered by plants can be provided at little or no cost to the plant. Examples of these were the services provided by haulers, such as advising patrons on quality and production problems, and delivering farm supplies or groceries to patrons. Other services that cost very little were selling supplies at cost price, cosigning notes, publishing a newsletter or offering group insurance. Some services, such as providing free cans, retinning cans free, and having a quality fieldman, cost more and must be paid from an increased processing and marketing margin. The plants, in continuing these services, may have felt that these services were a more effective way to increase and stabilize volume than to eliminate the services and pay a higher price. There are two advantages to competing on a service rather than on a price basis. First, the direct rivals are more sensitive to changes in price and can retaliate faster and also are more likely to meet the price change thus nullifying the effects of a price change. Forty-nine of the 56 plants buying cream reported a deliberate policy of paying a price relative to rivals and 15 of

Table 7. List of Auxiliary Services and Service Score Assigned to Each Service

Name of service	Service score
Haulers advise patrons on production problems	1
Haulers advise patrons on quality problems	1
Haulers deliver farm supplies	1
Haulers deliver groceries	1
Plant furnishes cans without charge	5
Plant furnishes every other can without charge	2
Plant furnishes cans at cost	1
Plant retins cans without charge	5
Plant retins every other can without charge	2
Plant furnishes dairy supplies at cost	1
Plant furnishes buttermilk to patrons at nominal charge	1
Plant gives buttermilk to farmer with no charge	2
Plant furnishes whey to patrons at no charge	2
Plant makes loans to patrons	5
Plant cosigns notes for patrons	3
Plant publishes a newsletter	1
Plant offers group insurance	1
Quality fieldman—full time	5
Quality fieldman—one-half time	2
Quality fieldman—less than one-half time	1

the 23 plants buying milk priced it relative to rivals. Second, the development of producer preferences by service differentiation tends to reduce producers' sensitiveness to price and leads to marketing habits and inertia on the part of the patron which tends to stabilize the volume of a plant.

Five plants had full time quality fieldmen and 16 other plants had quality fieldmen on less than a full time basis.

The auxiliary services were assigned points based on their apparent usefulness relative to reaching the volume goals of the plant management (Table 7). These service scores are somewhat arbitrary and their significance should be interpreted with caution. However, some sort of service score technique was necessary to reduce the complex of services to manageable proportions. The service scores were summed for each plant to obtain a rough index of the magnitudes of auxiliary services provided.

Unethical Practices

Concepts of fair competition and unfair competition are employed frequently in connection with competitive practices. Such concepts are usually based on ethical considerations and on the common practices of the trade. Attempts have been made by law to define and eliminate unfair competition. The National Recovery Act (NRA) provided "codes of fair competition," many states have passed a "fair trade law," and the Federal Trade Commission makes rulings on unfair competition.

No attempt was made in this study to define "unfair" and "unethical" competition. Each plant manager was asked: Do you consider any of your competitors' practices unethical? What are they? Do you feel that competition has forced you to use similar practices? If so, which ones and why?

Thirty-one of 59 plant managers considered one or more of their competitors' practices "unethical." Thirteen managers felt that their competitors' testing practices were "unethical," ten managers felt that their competitors' grading standards were "unethical," and four managers mentioned their competitors' weighing methods as "unethical" (Table 8).

It is evident that some managers tended to regard as "unethical" any

Table 8. Number of Eastern South Dakota Dairy Manufacturing Plant Managers Reporting Certain Competitors' Practices as Unethical, 1958

Type of practice	No. of plant managers reporting practice as unethical
Manipulation of test	13
Irregular grading	10
Irregular weighing	4
Differential pricing	3
Pay too high a price	3
Spread false rumors	3
Do not agree on price	2
Cooperatives do not pay income tax	1
Assembling milk by truck in another plant's territory*	1

*The plant that listed this practice was not receiving milk.

competitive practice that hurts them. Some practices which were listed as "unethical" were only changes in the status quo and are necessary competitive practices for a dynamic dairy marketing system.

Three managers reported that they had been influenced by competition to adopt similar "unethical" practices. The three "unethical" practices were (1) loose grading of cream, (2) manipulation of test, and (3) paying a higher price than the product was worth.

Most of the practices which the managers considered unethical were aimed at destroying competition and thus lessen the efficiency of the price system in allocating resources according to consumer demand. These practices are inimical to the interests of both consumers and producers. The manipulation of tests, weights, and grades makes it possible for an inefficient plant to compete on a price, quasi-price, and service basis with a more efficient direct rival. Competition as a stimulus to efficiency is thus thwarted and the inefficient plant continues to live under the umbrella of unfair practices. These same unfair practices mitigate the efficiency of competition in protecting various economic groups against exploitation. They make it possible to exploit sellers as a group to the benefit of the buyer. They also make it possible to exploit one group of sellers to the benefit of another group. Differential pricing between patrons is another form of exploitation of one patron vis-a-vis another patron.

Weighing and Testing

The most common practice in weighing cream was to round the weight to the nearest pound with the plant taking any weight up to and including the half-pound and giving any weight over the half-pound. Forty-four of the 56 plants followed this method and one additional plant took any weight up to three-quarters of a pound. Eleven plants buying cream dropped all fractions of a pound. There was no major difference between producer-integrated and non-integrated plants in the method of weighing cream, 79.5% of the producer-integrated and 77.2% of the non-integrated plants rounded the cream weights to the nearest pound. The 11 plants that took all tenths up to the next pound were somewhat smaller than the average plant as they had an average 1957 butterfat receipts of 432,181 pounds compared to an average of 552,433 for all plants in this study. The six producer-integrated plants that followed this practice had an average 1957 butterfat volume of 555.583 pounds compared to 284,116 for the non-integrated plants. The 11 plants that followed this practice paid an average total price of 63.40 cents per pound of butterfat compared to the same average price, 63.40 cents, for all plants in the study.

Rounding pounds of milk to the nearest pound was also the most common method of weighing milk as 14 out of 22 plants used this method. Eight plants dropped tenths of a pound in weighing milk. Six of these plants were producer-

integrated and two were non-integrated plants. The producer-integrated plants which followed this practice, from which price information was available, paid an average price of $3.04 per hundredweight of milk compared to an average price of $3.03 for all non-integrated type plants.

The managers of 45 of the 56 plants buying cream reported that in testing cream they rounded the test to the nearest whole or fractional percentage. There was no marked difference between producer-integrated and non-integrated plants in the method of testing, 82.4% of the producer-integrated plants and 77.2% of the non-integrated plants read fat tests to the nearest whole or fractional percentage. Eleven plants dropped all fractions of a percent in reading fat tests. The average 1957 volume of these 11 plants was 397,893 pounds of butterfat which was below the average of 552,433 pounds for all plants but the average total price of 63.77 cents per pound of butterfat paid by these 11 plants was slightly above the average price of 63.40 cents paid by the 56 plants. Assuming an average cream test of 30.5% butterfat, a plant that dropped all fractions in testing cream would receive 1.6% more butterfat than it paid for. If this advantage was paid out in the form of higher prices, this plant could pay 1.01 cents more per pound of butterfat based on butterfat price of 63.40 cents. The fact that the 11 plants which followed this practice were smaller than average but paid a slightly higher than average price may indicate that this testing method was being used to enable the plant to pay a higher butterfat price. In the case of the producer-integrated plant paying an agreed purchase price, this increment would increase the annual refund.

Nineteen of the 22 plants buying milk rounded milk tests to the nearest tenth of one percent and three plants dropped milk tests to the next lowest tenth.

RELATIONSHIP BETWEEN STRUCTURE AND CONDUCT

Market structures often are described in terms of a few major elements which are believed to account for most market behavior. The elements which are most commonly discussed are number of firms, size of firms, differentiation, and ease of entry and exit. The complex behavior of the market for manufacturing milk and cream cannot be explained adequately in such simple terms. Eight structural elements were identified that seemed to have a significant influence on the behavior of the market. These were product characteristics, service characteristics, numbers of buyers and sellers, size of buyers and sellers, spatial characteristics, integration, degree of knowledge, and ease of entry and exit.

Some of these structural elements may also be viewed as conduct. The structure of the market reflects past conduct or past conditions that have become institutionalized into the present structure and which influence present

behavior. Sosnick says that "structure and conduct overlap because certain events can usefully be viewed as patterns in some contexts and processes in others" (19, p. 387).

Product Characteristics

The characteristics of milk and cream affect the nature of competition among plants and the balance of power between the plant and the producer. Whole milk and, to a lesser extent, cream are both bulky and perishable. They can be shipped long distances or stored for long periods of time only at a high relative cost. These characteristics influence the location of milk production so that areas near centers of population produce fluid milk while areas further from the population centers, such as South Dakota, produce milk for manufacturing purposes. These characteristics, in conjunction with the level of processing and procurement technology known at the time of plant construction, account for the spatial distribution of plants within the area of production.

Raw milk, because of its perishability, does not lend itself to be sold on an offer and acceptance basis but must be sold on a prearranged pricing or pooling basis. The low relative value of a can of milk or cream also influences the method of sale of milk and leads to prearranged pricing agreements and the acceptance by the seller of a price taker role rather than the role of a price bargainer.

There are objective standards for measuring both quantity and quality of milk and cream. However, adequate weighing, testing, and grading equipment is relatively expensive and few producers can afford to own and operate such equipment. This places most of them at a disadvantage, particularly in testing and grading, because they have little opportunity to check the figures of the plants. Notable exceptions are members of dairy herd improvement and cow herd testing associations. The unequal balance of power between the plant and the producer makes it possible for the plant to use its weighing, testing, and grading procedures to compete with more efficient plants on a price or nonprice basis. Thirteen plant managers asserted that other plants use test manipulation to gain volume, ten managers asserted irregular grading by rival plants and four managers asserted irregular weighing. These beliefs may make managers less prone to utilize price as a competitive weapon because they recognize that their price advantage can be thwarted by test, grade, and weight manipulation. Producers also recognize the posibility of weight, test, and grade manipulation which r e i n f o r c e s their proclivity to sell to people they "know" and "can trust." This factor also tends to lessen price competition and the Wisconsin study inferred that fieldmen encourage this distrust by attempting to convince the farmers that prices average out and by questioning the operation of high paying plants (6, p. 52).

Service Characteristics

The basic service rendered by dairy plants to producers is purchasing milk and cream. Nicholls said that "a general class of 'services' is differentiated, if any significant basis exists, in the minds of the sellers, for preferring the services of one buyer over those of another" (14, p. 198). The basic purchasing service may be differentiated by location, method of assembly, and goodwill. Locational differentiation will be discussed under the rubric of spatial characteristics.

Milk and cream were delivered to the receiving stations or plants by the producers (stage 1) until the advent of the truck. Some buyers then provided an assembly service. Assembly service has been further differentiated into cream assembly, (stage 2) milk assembly by cans (stage 3), and milk assembly by bulk (stage 4). The plants in each stage of assembly have a procurement advantage over the plants in the preceding stage because producers tend to switch from hauling their own cream, to plant assembly of cream, to plant assembly of milk by cans, to plant assembly of milk by bulk. Producers seldom reverse the direction of this trend so plants using a more advanced assembly method can raid patrons from plants using a less advanced method with less fear of retaliation. The plants which assembled milk by bulk had an index of market power of 3.00 compared with an index of 2.07 for plants assembling milk by can and an index of 1.07 for the plants which received only door delivered cream (Table 9).

An assembly service encouraged the addition of auxiliary services such as delivering farm and dairy supplies, and advising the patron on production and quality problems. The 14 plants with no assembly service had an average auxiliary service score of 2.5 compared to a service score of 10.8 for all plants providing an assembly service.

The marketing of milk, in Eastern South Dakota at the time of this study included stages 1, 2, 3, and 4. The 1957 butterfat receipts in cream and milk were obtained from 55 of the 60 plants in Eastern South Dakota. The receipts of the remaining five plants were estimated.

The estimated amount of milk or milk equivalent received by the 60 plants in 1957 was 915,533,900

Table 9. Average Indexes of Market Power by Type of Assembly Service for 60 Dairy Manufacturing Plants in Eastern South Dakota, 1957

Type of assembly service	Stage	Number of plants	Index of market power
No assembly service	1	14	1.07
Cream assembly by cans	2	24	.96
Milk assembly by cans	3	14	2.07
Milk assembly by bulk	4	8	3.00

Table 10. Milk and Milk Equivalent Marketed at Different Levels of Technology by Type of Plant for 60 Dairy Manufacturing Plants in Eastern South Dakota, 1957

	Type of plant								
	Producer-integrated			Non-integrated			Total		
Level of technology	No. of plants*	Receipts lbs.	%	No. of plants*	Receipts lbs.	%	No. of plants*	Receipts lbs.	%
1. Patron delivered cream	27	127,328,600	23.1	21	269,254,200	74.1	48	396,582,800	43.3
2. Truck assembled cream	31	287,571,400	52.1	11	40,760,000	11.2	42	328,331,400	35.9
3 and 4. Can and bulk milk	17	137,161,200	24.8	4	53,458,500	14.7	21	190,619,700	20.8
Total	35	552,061,200	100.0	25	363,472,700	100.0	60	915,533,900	100.0

*The number of plants in each stage does not add up to the total because most of the plants received milk and cream in more than one stage.

pounds (Table 10). Farmers delivered 43.3 percent of the milk or milk equivalent to the creamery or cream stations in the form of cream (stage 1). Contract and plant owned trucks assembled 35.9% of all milk or milk equivalent marketed as cream.

The 1957 data did not distinguish milk received in bulk from milk received in cans. Consequently, stages 3 and 4 could not be separated. It was found that 20.8% of milk or its equivalent was marketed in these two stages. Plants in Eastern South Dakota first received milk in cans and bulk in November and December of 1955 and by 1957 about one-fifth of all milk or milk equivalent was marketed through this medium.

Managers of plants receiving bulk milk were called in June, 1959, and estimates were made of percentage of all milk received in bulk. According to these estimates, 18% of all milk marketed in Eastern South Dakota in June, 1959, was marketed as bulk and 33% of milk marketed to plants handling both can and bulk milk was marketed as bulk milk.

Goodwill is the relationship which develops between buyer and seller as a result of public relations activities, personal contact with the manager, owner, or agent of a plant and past policies and practices of a plant. Goodwill constitutes a nexus that ties producers to a specific plant even though other plants may be paying a higher price or offering more auxiliary services. In a business where "fudging" on weight and test is a com-

monly suspected practice, producers may feel it is important to deal with people they know and feel they can trust.

Producers become paired with plants simply by reason of service differentiation. Each plant has, therefore, a partial monopsony relative to a certain group of its patrons for as long as the plant continues to operate. If this group is not large enough to insure adequate volume, and it seldom is, the plant is subject to competition from other plants offering more or less imperfectly substitutable services. This competition sets a limit upon the exploitation of the plant's "own" clientele because the plant pays the same price to all patrons. If a plant pays a price lower than its direct rivals, it will lose those patrons whose preferences for that plant are least strong. It is the producers who are responsive to price and service differentiation who cause circular interdependence among direct rivals.

Numbers of Buyers and Sellers

The numbers of buyers and sellers in a market are usually considered to be the main determinant of market power. A large number of buyers will find themselves in an atomistic relationship if no single buyer can significantly affect the purchases of another buyer through a change in price or services offered. A small number of buyers tends to have a concentration of control of enterprise activity within the market. This generally results in circular power relations because each buyer recognizes the interdependence between himslf and his rivals. The relative numbers of buyers and sellers in the market influence the balance of power between the buyers and sellers. The balance of power tends to favor the side with fewer firms because the concentration of control is usually greater on that side.

In 1957, there were 2,062 plants in the United States engaged in butter manufacturing, 1,194 in cheese manufacturing, 3,395 in ice cream manufacturing, and 1,654 in cottage cheese manufacturing. These plants bought milk and cream from approximately 750,000 producers. In South Dakota, 60 plants purchased milk and cream for manufacturing purposes from approximately 32,000 producers. These plants were inter-related through a network of interlocking direct rivalry groups. The power relations among plants were neither atomistic, which the large number of plants would suggest, or simply circular which the small number of plants in each direct rivalry group would suggest. The power relations among these plants were complex — involving both direct and indirect circularity. This will be discussed in detail in the section on spatial characteristics.

The size of each direct rivalry group was compared with prices paid by plants within the group to determine if the amount of competition within the group influenced the prices paid. The small number of firms in each direct rivalry group indicated that the power relations, within each group, were

circular. The size of the direct rivalry group was compared with the total prices paid for cream, by the plants in the group[11] (Table 11). The highest average price of 65.20 cents per pound of butterfat was paid by the plants which only had one plant in their direct rivalry group. The three plants in this category reported that they set prices only on the basis of product prices and did not watch any other plants when setting the price. The lowest average price of 62.62 cents per pound of butterfat was paid by plants which had four plants in their direct rivalry group. There was no definite indication that the size of the direct rivalry group influenced the prices paid.

Table 11. Average Total Price Paid for Butterfat in Cream by Size of Direct Rivalry Group for 37 Dairy Manufacturing Plants in Eastern South Dakota, 1955-57*

Size of direct rivalry group	Number of plants	Av. price† cents per lb.
1 plant	3	65.20
2 plants	8	63.57
3 plants	7	63.27
4 plants	10	62.62
5 or more plants	9	63.58

*Only 37 plants gave information on prices paid to producers for butterfat in cream. Only plants buying cream directly from producers were included in this table. Plants buying through cream stations were omitted because their cost of butterfat figures included the commission paid to the cream station operators.
†The average prices are simple rather than weighed averages.

The size of the direct rivalry group was compared with the service score (Table 12). There was no consistent relationship between the size of the direct rivalry group and the services offered as measured by the service score.

Table 12. Average Service Score by Size of Direct Rivalry Group for 56 Dairy Manufacturing Plants in Eastern South Dakota, 1957

Size of direct rivalry groups	Number of plants	Average service score
1 plant	5	8.20
2 plants	14	7.14
3 plants	15	7.87
4 plants	11	9.64
5 plants and over	11	9.27

Sizes of Buyers and Sellers

Size, in this context, is largely a matter of the degree of financial strength. The financial strength of individual buyers or sellers can be measured by net worth, total assets, plant capacity, net earnings, or volume of sales and purchases. These are not good criteria, however, of the financial strength of a multiple-unit organization. Some of the dairy plants in Eastern South Dakota were owned by large corporate chains and their financial strength was not limited by these characteristics of the individual plants.

[11]Total price included price paid at the time of purchase, absorption of hauling costs by the plant, and patronage refunds paid in cash. Absorption of hauling cost was calculated by multiplying the percentage of milk or cream volume receipts by the amount of hauling cost, per unit of milk or cream, absorbed by the plant.

Net Worth

The 32 producer-integrated plants, which gave net worth information had a combined net worth, in 1957, of $2,789,000 for an average net worth of $87,156. Correlation of plant size, on the basis of net worth, showed that the larger plants paid a higher average price to producers than the smaller plants (Table 13). There was a definite break in the prices paid between plants above and below a net worth of $100,000. This was probably because the plants with greater financial resources were better able to adopt cost reducing technological changes than the plants with less financial resources.

Table 13. Average Total Price Paid for Butterfat in Cream by Net Worth for 25 Producer-Integrated Dairy Manufacturing Plants in Eastern South Dakota, 1957*

Net worth, dollars	Number of plants	Av. total price paid for butterfat in cream, cents per lb.
Less than 50,000	9	63.54
50,000-99,999	8	63.53
100,000-149,999	3	65.64
150,000-199,999	3	65.89
200,000 and over	2	65.96

*Complete price information was received from only 25 of the 32 integrated plants.

The average index of market power was .69 for the 13 plants with a net worth of less than $50,000 and increased with each larger level of net worth (Table 14). The two plants with a net worth over $200,000 had an average index of market power of 6.0. Financially strong plants have more firmly entrenched competitive positions and would be better able to defeat a weaker plant in a "price war." Price wars are seldom used as tools of competitive strategy but the fear of a price war influences the decisions made by the management of financially weaker plants. Some of the direct rivals of the two centralizers which were owned by large multi-plant corporations were well aware of their disadvantageous financial position and the managers reported that they "kept in line" with the price paid by the centralizer rather than risk a price war.

Table 14. Average Index of Market Power by Net Worth for 32 Producer-Integrated Dairy Manufacturing Plants in Eastern South Dakota, 1957

Net worth, dollars	Number of plants	Average index of market power
Less than 50,000	13	.69
50,000-99,999	10	1.80
100,000-149,999	3	2.00
150,000-199,999	4	4.25
200,000 and over	2	6.00

Volume of Receipts

Butterfat receipts for 60 plants varied from 29,000 to 3,100,000 pounds in 1957 and averaged 522,433 pounds. Comparison of volume of receipts with total prices for butterfat in cream indicated that the larger volume plants paid, on the average, a higher total price

Table 15. Average Prices Paid for Butterfat in Cream by Size of Plant for 26 Producer-Integrated Dairy Manufacturing Plants in Eastern South Dakota, 1957

Volume of butterfat receipts, lbs.	Number of plants	Payment for butterfat in cream				
		Purchase price	Absorption of hauling costs	Patronage refund	Total price	Difference
		(cents per pound)				
Less than 250,000	6	58.55	2.09	2.27	62.91	+1.25
250,000-499,999	10	58.59	1.99	3.58	64.16	+.96
500,000-999,999	2	58.64	3.29	3.19	65.12	+.56
1,000,000 and over	3	57.39	2.80	5.49	65.68	

than the smaller volume plants (Table 15). Only producer-integrated plants were included in this analysis so price differences due only to differences in volume could be determined. The volume of receipts did not influence the price paid producers at the time of purchase, indicating that purchase price was not a means by which large and small volume producer-integrated plants competed. The large volume plants absorbed a greater share of the hauling costs and paid a larger cash patronage refund than the smaller volume plants. The overall price advantage to a producer to sell his cream to a plant receiving over a million pounds of butterfat annually rather than to a plant receiving less than 250,000 pounds averaged 2.77 cents per pound of butterfat for producer-integrated plants.

Comparison of volume of receipts with total prices paid for milk indicated that, with the exception of one plant receiving less than 250,000 pounds of butterfat annually, volume of receipts had very little if any influence on total prices paid (Table 16).

Comparison of volume of receipts with service scores indicated that the most services were offered by plants receiving less than 250,000 pounds of butterfat annually (Table 17). Many of the services offered cost little or nothing to the plant and the low volume plants may have felt that they could better afford to compete on a service rather than on a price basis.

It was found that the larger plants utilized higher levels of technology (Table 18). No plants re-

Table 16. Average Prices Paid for Milk by Size of Plant for 11 Producer-Integrated Dairy Manufacturing Plants in Eastern South Dakota, 1957

Volume of butterfat receipts, lbs.	Number of plants	Payment for milk				
		Purchase price	Absorption of hauling costs	Patronage refund	Total price	Difference
		(dollars per hundredweight)				
Less than 250,000	1	2.66	—	.07	2.73	+.29
250,000-499,999	3	2.88	.08	.06	3.02	+.01
500,000-999,999	5	2.89	.05	.09	3.03	+.01
1,000,000 and over	2	2.79	.15	.10	3.04	

Table 17. Average Service Score by Size of Plant for Producer-Integrated Dairy Manufacturing Plants in Eastern South Dakota, 1957

Volume of butterfat receipts	Cream patrons		Milk patrons	
	Number of plants	Average service score	Number of plants	Average service score
Less than 250,000	9	10.33	2	13.50
250,000-499,999	12	8.75	6	9.83
500,000-999,999	9	9.33	8	8.75
1,000,000 and over	4	7.78	2	12.50
Total	34	—	18	—

ceiving less than 250,000 pounds of butterfat annually used bulk tank procurement while the percentage utilizing bulk tanks increased to 16% for plants in the 250,000-499,999 pounds of butterfat bracket, to 33% in the 500,000-999,999 pound bracket, and to 50% in the over 1,000,000 pound bracket.

The comparison of volume of receipts with the index of market power showed that market power increased as the volume of receipts increased (Table 19). The 26 plants that received less than 250,000 pounds of butterfat in 1958 had an average index of market power of .42. The index increased to 1.15 for the plants in the 250,000 –499,999 pound category, to 2.08 for plants in the 500,000–999,999 pound category while the eight plants that received over one million pounds of butter-fat had an average index of 4.62.

Spatial Characteristics

Spatial characteristics are involved in the locational distribution of buyers and sellers. Milk and cream are produced on widely scattered farms and assembled into central plants for processing. The costs of assembling the products are such that plants tend to be located separately, each procuring from the area adjacent to it. Distance affects: (1) the knowledge which a producer has about prices and services, (2) the confidence which producers have in a plant's

Table 18. Percentage Distribution of 35 Producer-Integrated Dairy Manufacturing Plants in Eastern South Dakota According to Size of Plant and Level of Technology, 1958

Volume of receipts	Level of technology*				
	1	2	3	4	Total
	(Percentage of plants)				
Less than 250,000	10	70	20	0	100
250,000-499,999	17	33	33	17	100
500,000-999,999	0	11	56	33	100
1,000,000 and over	0	50	0	50	100

*Level 1, door delivered cream; 2, cream assembled by truck; 3, milk assembled by truck; 4, milk assembled in bulk.

weighing, testing, and grading practices, and (3) transportation costs from producer to plant.

Spatial differentiation results in complex power relations among buyers. The market group of buyers of manufacturing milk and cream includes thousands of spatially separated plants. Each plant has some control over price in buying and is, therefore, a price maker. The plant manager, as a price maker, takes into consideration the actions and reactions of his direct rivals so the power relations within each direct rivalry group are circular. The effects of changes made by a plant's indirect rivals are transmitted through the direct rivals so the effects are generally attributed to the direct rivals. Indirect rivals are generally ignored in making decisions although a circular power relationship exists because of the overlapping of direct rivalry groups. The power relations among indirect rivals were "indirect circular." The power relations, in a market with both direct and indirect circular power relations, are termed "complex".

Complex power relations severely limit collusion among independent buyers. An agreement to depress prices would be difficult. However, each plant has a small range within which it can modify price because of pairing of patrons and plants due to service and spatial differentiation.

Table 19. Average Indexes of Market Power by Size of Plant for 60 Dairy Manufacturing Plants in Eastern South Dakota, 1958

Volume of butterfat receipts, lbs.	Number of plants	Average index of market power
Less than 250,000	26	.42
250,000-499,999	13	1.15
500,000-999,999	13	2.08
1,000,000 and over	8	4.62
Total	60	1.52

The limitation upon price manipulation for plants with complex power relations leads the plant management to differentiate its buying by means of services to sellers. The services of plants in such a market are, by the nature of the market, spatially differentiated so buyers and sellers are not paired at random. Additional differentiation of the products or services allows the plant further maneuverability in price decisions. Complex power relations are conducive to swift movement of price changes, rapid adoption of new technology unless artificial restrictions interfere with its adoption, and strong preference for competitive practices other than price.

The spatial distribution of plants also results in "ties" between the farmers and the community where the plant is located. In many communities the dairy manufacturing plant was the largest employer and was the "life blood" of the community. Farmers may feel a responsibility toward the local plant or may feel an implicit guilt emanating from "what the neighbors may think" if they sell to an outside plant.

Local businessmen are also anxious to keep the creamery going

and in three communities capital had been raised from local businessmen and farmers to form local stock companies to buy out the local plant which was shutting down. These local companies were not organized to return profits to capital owners but only to keep the plant in operation. When certain farmers feel such a responsibility to local communities they become somewhat insensitive to differences in price or service among plants. However, the ties between a producer and a local community are probably weakened by the existence of assembly services.

The distribution of market power is closely related to spatial distribution. It may be concentrated in local areas despite "large" numbers of "small" firms in the group as a whole. A plant's possession of usable market power depends upon its relative isolation. If it has a large procurement area, a large part of which is free from rivalry of other plants, it may be able to utilize a great deal of its power in dealing with producers. In practice, no plant has unlimited market power because of the overlapping of procurement areas and the threat of other plants expanding into their procurement area. A large discrepancy in the relative terms of trade may encourage other large plants to expand into an area. Assembly costs are not directly proportional to distance and it is possible to haul milk considerable distances at low cost once a truck has been loaded and on a good highway.

Integration

Two of the usual simplifying assumptions in price theory are that each firm is a single plant operation and that it is completely vertically integrated so that producers sell directly to the consumers. In reality, there are various degrees of horizontal and vertical integration in different markets and often within a given market. An organization that is integrated either horizontally or vertically is able to shift and concentrate its market power in certain geographical areas or in certain stages of the distribution process. The market power of an integrated organization is more effective because it is more mobile.

Integration was quite common among the dairy manufacturing plants in South Dakota. Thirty-five plants were producer-integrated. These plants represented horizontal integration in the form of collective action by producers and vertical integration of the producer to the processor level. These organizations cannot be classified as true buyers although they did take legal title to the products they handled. They were agents of their member producers and as such they represented them in processing the raw material and selling the finished product to wholesalers and other buyers.

The previously discussed "relative number of buyers and sellers" becomes less meaningful when most of the plants are producer-integrated. The relative bargaining power of producers was strengthened in those areas served

by integrated plants whether they actually patronized the integrated plant or not. The presence of an integrated plant tended to limit the market power of the non-integrated or profit-type plant.

In addition to the 35 producer-integrated plants, two plants were owned by large multi-plant corporations and were horizontally integrated operations. The market power of these plants was respected by their direct rivals because of their greater financial resources. The market power due to greater financial resources is magnified by integration. An integrated organization has greater market power than a non-integrated plant of equal financial resources because it can make profits at one plant or one stage of offset losses at another plant or stage of the distribution system. For purposes of analysis, these two plants were included in the non-integrated group to distinguish them from the producer-integrated plants.

Type of Plant

The analysis in this section includes only the 34 producer-integrated and 23 non-integrated plants which manufactured butter. The 34 producer-integrated plants received 19,309,144 pounds of butterfat in 1957 for an average of 567,916 pounds per plant. The 23 non-integrated plants received 10,440,341 pounds of butterfat for a per plant average of 453,928 pounds. If there are economies of scale in manufacturing butter, the difference in volume of receipts between a producer-integrated and a non-integrated plant should influence prices paid to producers for butterfat. This conclusion was supported by price information collected in this survey for the years 1955, 1956, and 1957 (Table 20). Producer-integrated plants paid an average total price of 64.31 cents per pound of butterfat compared to 61.26 cents paid by the non-integrated plants.

The range of total prices paid by producer-integrated plants was from 60.41 cents to 66.67 cents per pound of butterfat, and 80.8% of the integrated plants paid an average price within two cents of the mean. The range of total prices paid by the non-integrated plants was greater, ranging from 57.29 to 66.39 cents per pound of butterfat, and 54.5% of the

Table 20. Price and Quasi-Price Payments for Butterfat in Cream by 37 Eastern South Dakota Dairy Manufacturing Plants by Type of Plant, 1955, 1956, and 1957

	Type of plant			
	Producer-integrated		Non-integrated	
	Number of plants	Av. price cents per lb.	Number of plants	Av. price cents per lb.
Average price at time of purchase	26	58.46	11	60.20
Absorption of hauling cost	---	2.45	---	1.06
Patronage refund (cash)	---	3.40	---	---
Total prices	---	64.31	---	61.26

non-integrated plants paid an average price within two cents of the mean. This indicated either a greater variablity in the processing costs of non-integrated plants vis-a-vis producer-integrated plants or that some non-integrated plants capitalized on greater profit opportunities. To eliminate, as far as possible, variabilities in processing costs due to volume of receipts, only the plants which received less than 250,000 pounds of butterfat annually were considered.[12] The average total price paid by the producer-integrated plants in this category was 62.92 cents per pound of butterfat which was 1.76 cents more per pound of butterfat than the average total price of 61.16 cents paid by the non-integrated plants. Furthermore, all six of the producer-integrated plants paid a price within a range of their mean plus or minus one cent and only four of the ten non-integrated plants prices fell within a range of their mean plus or minus one cent. The range of prices paid by the non-integrated plants was from 57.29 cents to 66.39 cents per pound of butterfat. It seems reasonable to conclude that plants receiving less than 250,000 pounds of butterfat per year had similar cost structures and some non-integrated plants were able to capitalize on greater profit opportunities by paying a lower price to producers.

In addition to paying a higher average total price the producer-integrated plants buying cream provided, on the average, more services to producers. The 34 producer-integrated plants that purchased cream had an average service score of 9.06 and the 22 non-integrated plants had an average score of 6.41. Measured on an equivalent volume of receipts basis the nine producer-integrated plants that received less than 250,000 pounds of butterfat in cream annually had an average service score of 10.33 as compared with a service score of 7.5 for the 16 non-integrated plants in this category.

This study showed that the producer-integrated plants were more prone to adopt new technology than non-integrated plants. Eight of the 16 non-integrated plants with less than 250,000 pounds of butterfat volume in 1957 received only door delivered cream while only one of the 10 producer-integrated plants in the same category received only door delivered cream. Seventy percent of the producer-integrated plants assembled cream by truck while 44% of the non-integrated plants were at this level of technology.

An analysis of the market power of the 60 plants in the survey showed than the non-integrated plants had, on the average, less market power than the producer-integrated plants. The average index of market power of the 35 producer-integrated plants was 1.91 as compared to an index of .96 for the 25 non-integrated plants in the survey. The average index of all the plants was 1.52. Ten out of 35 producer-

[12]This category of volume of receipts was selected because ten out of eleven non-integrated plants were in this category. There were six producer-integrated plants in this category.

integrated plants and 15 out of 25 non-integrated plants had an index of market power of zero[13] (Table 21). With the exception of three centralizers, all non-integrated plants had an index of market power of two or less while 68.57% of the integrated plants had an index of two or less.

Degree of Knowledge

The importance of "degree of knowledge" as a structural element is the influence it has on the balance of power between buyers and sellers. The general level of knowledge among buyers and sellers was not measured in this study. A similar study in Wisconsin found that "with few exceptions, managers knew which firms were paying highest and lowest prices in the area. There seemed to be great price information among firms" (5, p. 27). Plant managers are better informed for several reasons: (1) they are trained to observe certain criteria of market behavior, (2) it is easier for them to obtain relevant information, (3) it is customary for managers to exchange price information regularly, (4) they understand and have facilities to measure technical relationships, and (5) dairying is a sideline to most producers, so they do not try to keep themselves well informed about dairy marketing conditions. Producers generally have inferior knowledge about prices and other relevant factors. Even if a producer should know that one plant has a higher quoted price than another, he probably does not know how their hauling charges, value of miscellaneous services, or their weighing-testing-grading practices compare.

Another Wisconsin study report-

[13] An index of market power of zero indicated that at the time the study was made no plant looked to that particular plant when making price decisions. An index of zero does not mean that a plant does not have any market power—it does indicate that the plant was not exercising any power at the time the schedules were taken.

Table 21. Classification of All Dairy Manufacturing Plants in Eastern South Dakota by Index of Market Power and Type of Plant, 1958

Index of market power	Type of plant: Producer-integrated		Non-integrated		Total	
	Number of plants	Cumulative percentage	Number of plants	Cumulative percentage	Number of plants	Cumulative percentage
0	10	28.57	15	60.00	25	41.67
1	10	57.14	5	80.00	15	66.67
2	4	68.57	2	88.00	6	76.67
3	3	77.14	0	88.00	3	81.67
4	5	91.43	1	92.00	6	91.67
5	1	94.29	1	96.00	2	95.00
6	0	94.29	1	100.00	1	96.67
7	1	97.14	0	—	1	98.33
8	1	100.00	0	—	1	100.00
Total	35	—	25	—	60	—

ed that "opinions of sellers about milk weights and tests tended to bind them to their buyers and discourage changing to other firms. In general, sellers believed they obtained accurate tests and weights from the firms to which they currently sold milk but they suspected or were uncertain as to the accuracy of the tests and weights given by alternative buyers. . .Such suspicion or uncertainty discourages sellers from changing to another firm" (4, p. 20). Another important consideration is patronage refunds. A producer may know the past record of a plant for paying refunds, but he is very unlikely to know what the current earnings situation is and what magnitude of price adjustment he may expect, if any.

The degree of knowledge is interrelated with the number of firms on each side of the market. Scitovsky mentioned that one of the conditions of price setting is the inexpertness on one side of the market which is characteristically the side of large numbers (18, p. 19).

The efforts of the United States Department of Agriculture, state agencies, newspapers, radio stations, and various producers' associations help considerably to inform producers. A dairy farmer who actively seeks to be informed may have as much knowledge about the market as do most managers. However, the fact remains that most managers are far better informed than most producers. This serves to increase the balance of power favoring the buyers. It is also true that the better informed managers have a competitive advantage over their less well informed rivals. Many managers were promoted from technical jobs to management. They lack both formal education and business training, and they do not know how to obtain the information they need or how to use what they have. Market power tends to be increased by better knowledge.

Ease of Entry and Exit

The ease of entry of new firms into a market affects the market behavior of the existing firms in the market. The possibility of entry of new firms into a market group is a source of competitive pressure. This pressure limits the advantages that price makers can derive from their market positions.

Papandreou and Wheeler say that the threat of entry is greatest when "a firm can become a member of a group on terms which are at least as favorable as those which are available to the firms which make up the group in question" (15, p. 177).[14] They listed five types of restrictions on entry. They were: (1) terms on which technological data and technologies are made available, (2) terms on which factors of production are made available, (3) terms on which outlets for the product are made available, (4) consumer allegiances, and (5) outright legal restrictions (15, p. 179). Using these criteria as a standard, new dairy manufacturing plants entering a market group would find: (1) the methods of

[14]The pertinent group in a market with spatial competition would be the direct rivalry group.

assembly and processing widely known and freely available to newcomers, (2) their manufactured products could be sold as readily as the existing plants' products, (3) no consumer allegiances to the major proportion of its product, and (4) no legal restrictions. The new plant would, however, be at a disadvantage in raw material procurement. It was found that producers' allegiances build up through the years so producers tend to be paired with certain plants on the basis of goodwill and locational preferences. These preferences could be broken through paying a higher price or offering more auxiliary services to producers but this raises the cost of the raw materials over what the existing plants in the group must pay.

Other factors which limited the entry of new plants into the area of study were the declining production of milk in South Dakota and the larger optimum scale of existing plants. These factors have led to a declining number of dairy manufacturing plants in South Dakota over the past three decades.

The number of plants in the unit of study was decreasing so the ease of exit is, currently, a more pertinent element of structure than ease of entry. Ease of exit is contingent upon the opportunity to find alternative uses for the investment in land, buildings, and equipment. Plants unable to liquidate these assets at a reasonable price or unable to use them for other purposes are likely to continue in operation as long as variable costs are covered.

Most of the dairy manufacturing plants in Eastern South Dakota were located in small towns where there were few, if any, alternative uses for the buildings. The value of the building was, in many cases, very low in terms of alternative uses. Other uses for the equipment were limited also. A great part of the equipment was technologically obsolete and, being highly specialized, had no use outside of the dairy industry. As a result of these deterrents to exit, plants were not leaving the market group fast enough to permit adjustment to changing production patterns and changing technology in milk processing and assembly. The consequences of this "surplus" of dairy manufacturing plants was: (1) excessive overlapping of milk and cream assembly routes which lead to a misallocation of resources in milk and cream assembly, (2) an inefficient size processing plant relative to current technology, (3) a relaxation of quality standards, and (4) an encouragement to use unethical practices to stay in business. These three consequences were initiated by exit deterrents but their realization was made possible by other structural elements.

EVALUATION OF MARKET POWER AND PERFORMANCE

Market Power

Market power is the ability of a seller or buyer to influence market behavior. Two aspects of market power were distinguished—power relations and balance of

power. Power relations concern the ability of a buyer or seller to affect the behavior of another buyer or seller on the same side of the market.

Power relations among plants in each direct rivalry group were found to be circular with varying degrees of influence exercised by plants within the group. Generally speaking, the greatest influence was exercised by producer-integrated plants receiving both can and bulk milk. The least influence was exercised by non-integrated plants receiving less than 250,000 pounds of butterfat per year and receiving only door delivered cream. In some cases the power relations between a large and a small plant approached dominance. As measured in this study the apparent influence of 25 of the 60 plants was nil. However, these plants probably had enough potential influence to merit classifying their power relations with larger plants as circular but with the larger plants approaching dominance.

Power relations between a plant and its direct rivals were indirect circular. Plants were affected by the actions of their indirect rivals but the effects were transmitted through their direct rivals. The reactions of indirect rivals to policy changes were not considered while the reactions of the direct rivals were considered. This combination of direct and indirect circularity was called complex power relations.

Plant managers were cognizant of the power relations between themselves and their direct rivals and also of the relative market power of their direct and some of their indirect rivals. Managers were generally aware of what their market power enabled them to do and what acts would be unwise.

The 1959 census of agriculture reported that 25,075 farms in Eastern South Dakota had one or more milk cows. The South Dakota Crop Reporting Service reported 258,500 milk cows in this 44 county area for an average of 10.3 milk cows per farm reporting one or more cows.

The power relations among these 25,075 milk producers were atomistic. Each producer was a price taker. He could decide how much to produce and sell but he had to sell at the price offered by the plants. Most of the producers in the area had two or more alternative outlets for their milk and their choice of outlet was made on the basis of price, service differentiation, or auxiliary services offerd.

The distribution of market power heavily favored the buying plants. This resulted in price setting by plants with producers taking a passive role in the process. The factors which enhanced the market power of the plants vis-a-vis the producers included the bulkiness and perishability of the product, the differentiation of the buying service, the comparatively smaller numbers and larger sizes of the plants, better knowledge of market conditions by plant managers, and the relative difficulty for new plants to enter the market. The

effect of imbalance of power was greatly modified by the prevalence of producer-integrated plants.

Market Performance

The performance of the market can be evaluated only in light of the things producers and consumers want the market to do for them. The standards of performance set up in the study were: The marketing system should (1) reflect efficiently consumer demand relative to quantity, quality, and kind of goods, (2) reflect producers' demand for services, (3) be progressive in the development of new products and techniques of production, (4) maximize efficiency relative to known technology.

The relationships among the dairy processing plants seemed to constitute reasonably workable competition. The price paid at the time of purchase was heavily influenced by local price leaders and was a reflection of market conditions. There was general uniformity throughout the area on prices paid at the time of purchase but less uniformity on total prices paid. Some non-integrated plants were able to "shade" the total price paid because they did not offer assembly service or pay patronage refunds. The structure of the market, including overlapping supply areas and the presence of producer-integrated plants, limited this price "shading" to a few relatively isolated plants which had strong locational or service differentiation. The buyer-dominant balance of power resulting from imperfect knowledge, inertia, and habit on the part of the seller also contributed to "price shading" practices. The total prices paid by the plants were close to market value of finished products less processing and marketing costs. They tended to reflect consumer demand relative to quantity, quality, and kind of dairy products insofar as they were accurately transmitted to them by wholesale buyers.

This study did not test the attitude of producers toward the services offered them by the plants. Thirty-three of the plants were cooperatives and in these plants most of the decisions relative to adding or deleting services were made by producer members or their elected directors. It seems safe to assume that the services offered by cooperative plants reflect the wants of the producers. In a Wisconsin study dairy producers were questioned about their knowledge and satisfaction with non-price services. It found that "Patrons generally approved of the non-price services and public relations activities of their dairy plants and believed that having them stopped would lead to little or no increase in the prices received for milk" (4, p. 34). With the exception of more intensive use of fieldmen, the services offered by the plants in the Wisconsin study were very similar to those offered by the plants in this study.

The third and fourth performance norms concern the development and adoption of technology. Technological change is envisioned as having three components which are (1) changes in techniques of

production or processing, (2) changes in economic organization, and (3) product changes. Technological change, in each of these components, has two phases. The first phase is innovational and covers the process by which new techniques or products are developed. The second phase is the imitation or adoption of the new technology.

The innovational activity that contributes to a progressive dairy marketing system is a difficult area to assay. This study was not designed to measure innovational activity but general comments are germane. Innovations in techniques of processing are generally made by equipment supply companies and state and Federal departments of agriculture and experiment stations. Innovations in economic organizations are made by processing plants, equipment supply companies, and experiment stations. Innovations in new products are made by the larger processing plants in the market group and experiment stations. It is, therefore, not necessary for the dairy manufacturing plant to innovate in order to have a progressive dairy marketing system. In fact, in most cases, it would be uneconomical for plants to engage in research activities to devise a new processing technique or new product.

The adoption of technology is reflected in the efficiency of plants in the market. Certain market characteristics such as large numbers and atomistic power relations are conducive to the spread of technology. Other market structures retard the adoption of technology and thus circumscribe the efficiency of the plants in the market group.[15] Certain structural elements in the market under study were conducive to the rapid adoption of technology. The large numbers of plants in the market deterred collusion by all the plants in the market group and the interlocking of direct rivalry groups rendered collusion within a direct rivalry group ineffective. The interlocking of direct rivalry groups also provided the mechanism and pressure for the spread of technology throughout the market.

Other structural elements mitigated the pressure for adopting technology in order to increase efficiency. The structure of the market made it possible for inefficient plants to continue in operation. The pairing of plants and producers due to service and spatial differentiation, and the lack of knowledge on the part of the producer due to product and spatial characteristics, made it possible for inefficient plants to stay in operation even though they paid a lower total price. These same structural characteristics also made it possible for plants to engage in irregular grading, testing, and weighing practices and thus compete on a price basis. The suspicion of irregular grading, testing, and weighing practices seems to have been prevalent enough to mark them as established practices in some plants and

[15]Cf. Yale Brozen (3, pp. 239-257) on the determinants of the rate of imitation of technology. Especially read page 244 on the effect of market organization on the rate of imitation.

real problems in the market.

The structure of the market also promoted considerable overlapping of assembly routes and this resulted in higher assembly costs. The elimination of overlapping assembly routes through some cooperative arrangement could lower collection costs but might also lower the market power of the producer vis-a-vis the plant. This latter shortcoming could be eliminated if most of the plants were producer-integrated plants. While greater efficiency could be achieved in both assembling and processing the raw product, the existing level of inefficiency was not considered a serious malfunctioning of the market.

SUMMARY

There were 60 dairy plants in Eastern South Dakota purchasing manufacturing milk and cream directly from producers in 1957. The procurement areas of these plants overlapped extensively, forming a network of direct competitive relationsips in which each plant was influenced directly by a few other plants and indirectly by all other plants in the market. The direct and indirect substitutability of purchasing services indicated that all plants in the study, and possibly all dairy manufacturing plants in the country, were operating in a single market. Likewise, the substitutability of manufacturing milk and cream indicated that all producers of these products were operating in a single market.

The dairy plants used various strategies to achieve their procurement goals. These were classified as price, quasi-price, and non-price practices. Few managers used price manipulation as a means of attracting patronage because of the near certainty of immediate retaliation. Most managers set prices in relation to competitors' prices, finished product prices, or both. Thirty-nine managers reported that they sought to pay the average of their competitors' prices for cream and 13 reported that they sought to pay the competitive average for milk. Most managers exchanged price information regularly by telephone. They usually notified neighboring managers before making a price change. The number of plants which looked to each plant for price information was used as a rough measure of its market power.

Quasi-price practices included hauling subsidies and patronage refunds. Truck assembly services were provided by 39 of the 56 plants which bought cream and all of the 22 plants which bought milk. Among the plants which assembled cream, 36 bore the entire cost, two shared the cost with producers, and only one bore none of the cost. Only three of the milk plants bore the entire cost of assembly, five shared the cost with producers, and 14 bore non of the cost. Patronage refunds on cream were paid in one or more of the years studied (1955, 1956, and 1957) by 26 of the 34 producer-integrated plants which made butter. Patronage refunds on milk were paid by eight plants in 1957.

Dairy plants provided a variety

of non-price services. Cream cans were furnished at no explicit charge by 27 plants and at less than the usual retail price by most of the others. All of the milk plants furnished milk cans and only two charged the full retail price. About half of the plants paid the costs of retinning cans. Most of the assembly truck drivers advised patrons on milk production and problems relating to quality milk. Less common services included making loans, cosigning notes, newsletters, and group insurance. Each of the services was assigned an arbitrary value and a total auxiliary service score was computed for each plant.

Thirty-one managers reported unethical practices by competitors. The most frequently mentioned were incorrect testing, grading, and weighing. Some pricing practices were regarded as "unfair."

Most managers reported that in testing for butterfat they rounded to the nearest percent or tenth percent. Most rounded to the nearest pound in weighing. It was customary to take the lower of two points if the reading was halfway between them. A few managers reported that all fractions were dropped in testing and weighing. This did not necessarily result in any inequity but it allowed them to quote a higher nominal price then they were actually paying.

Most of the literature on market structure lists the important elements of structure as number of firms, size of firms, product differentiation, and ease of entry and exit. Several additional elements were found in this study to have a significant influence on market behavior. Product characteristics, such as bulkiness and perishability, fundamentally affect the way a product is traded. Milk cannot be as readily stored or shipped to different marketplaces to obtain better terms as can products like wheat and corn. Service characteristics may cause buyers and sellers to become paired. This tends to limit "shopping around" for better terms. The basic service provided by dairy plants—*purchasing* milk and cream—is differentiated by location, method of assembly, and goodwill.

The number of buyers and sellers usually is considered a major determinant of market power. However, power relations among dairy plants were not atomistic despite their relatively large numbers. Some concentration of market power was made possible by the spatial separation of plants which limited the extent of direct competition. The size of the direct rivalry group appeared to have no significant influence on either prices paid or services rendered. The influence of numbers seemed to be strongly modified by other elements.

Size of plant (and of firm in cases involving multiple-unit organizations) directly influenced market behavior. Two measures of size were used in this study—net worth and volume of butterfat receipts. Average prices for cream were directly related to size. However, there was little variation in milk prices among size groups. Service scores were inversely related to size in the case of cream and there was no consistent relationship in

the case of milk. There was a strong positive relationship between size and market power. The plants with net worth of $200,000 or more had an average market power score nine times that of the group with less than $50,000 net worth.

The spatial distribution of producers and plants strongly influenced market behavior. The plants tended to be located separately because of the need to assemble milk and cream from comparatively large areas in order to achieve reasonable economies of scale. As a result, each producer had a choice between only a few buyers. The more distant the location of the buying plant, the less the producer was likely to know about its prices, services, and reliability. The assembly areas of most plants overlapped from one to five others. Thus, each plant had only a few direct rivals and power relations among them tended to be circular. However, the interlocking of direct rivalry groups created a network of communication connecting all plants in the market. Consequently, the effects of every price change tended to be relayed rapidly throughout the system. The resultant complex power relations largely prevented both independent action and overt collusion. This left only two alternatives—tacit agreement or price war. The danger of price war caused competitive strategies to be focused largely on service differentiation.

The type and extent of integration had a significant effect on market power. Thirty-five of the 60 plants were classified as producer-integrated and 25 as non-integrated. Most of the former were cooperatives and most of the latter were independents. The average initial price paid for cream was lower for the producer-integrated plants but the total payment, which included hauling subsidies and patronage refunds, averaged about 5 percent higher than for the non-integrated group. The producer-integrated plants also provided more auxiliary services to producers. The average service score for producer-integrated plants buying cream was 50 percent greater than that of the non-integrated plants. The average market power score for the producer-integrated plants was double that of the non-integrated plants. The market power of the producer-integrated plants was enhanced by the fact that they were the agents of the producers. This market power tended to be used for the benefit of the producers because the interests of the producers and their plants were similar.

The degree of knowledge affected the balance of power between buyers and sellers. No objective measure of knowledge was attempted in this study but plant managers obviously were better informed about the dairy market than were most producers. Ease of entry and exit also influenced market behavior. The chief barriers to entry for new plants were the high fixed capital requirements and the pairing of producers with existing plants. It would have been very difficult for a new plant to obtain

adequate volume in most areas. The exit of dairy plants was curtailed for the same reasons. The high fixed investment in highly specialized equipment permitted plants to remain in operation for years despite net operating losses. The optimum size of dairy plants has grown much faster then the rate of plant exit. Consequently, most plants were operating far below capacity. Efforts to obtain greater volume led to excessive overlapping of procurement areas, slowness in adopting new technology, sacrifice of quality, and encouragement to engage in unethical procurement practices.

It was concluded that power relations among buyers were complex—directly circular between plants within a direct rivalry group and indirectly circular between plants in different rivalry groups. The degree of market power was related to level of technology, size, and type of plant. Power relations among producers were found to be atomistic. The balance of power strongly favored the plants. However, the prevalence of producer-integrated plants and the efficient communication of competitive forces throughout the market tended to lessen the imbalance of market power to a marked degree.

It was further concluded that the relationships among dairy plants constituted reasonably workable competition. Prices paid seemed to reflect market conditions. The overlapping of procurement areas undoubtedly had an adverse effect on procurement costs but, coincidentally, it gave producers more choices among buyers and it tended to inhibit overt collusion. Apparently, the services provided to producers reflected their wants. The development of new technology seemed fairly progressive although little of it was done by the plants or producers. The rate of adopting new technology seemed reasonably rapid although barriers to exit encouraged many technically inefficient plants to remain in operation.

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