MARKETING MINNESOTA'S DAIRY PRODUCTS
Characteristics, Problems, and Needs

Jerome W. Hammond
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In 1963 the Minnesota Legislature appropriated funds for aiding the Minnesota dairy industry to develop new products and markets. The funds are obtained from a sales tax on colored oleomargarine. The Governor directs expenditure of funds after consultation with the Legislative Advisory Committee.

To assist in planning the best use of these funds, Governor Karl F. Rolvaag appointed a Governor's Advisory Committee on Dairy Research and Marketing. The committee includes dairy farmers, dairy firm managers, a food scientist, a legislator, a banker, an attorney, several Institute of Agriculture staff members, and the Commissioner of Agriculture.

This committee decided that the principal consideration for using funds should be "to better the financial returns of Minnesota farmers from the dairy enterprise." The committee agreed that dairy research should be emphasized, including (1) research on product technology and (2) legal and market research. Various research proposals were reviewed. Finally, the committee recommended proposals on product technology and dairy marketing submitted by the University of Minnesota's Department of Dairy Industries and Department of Agricultural Economics, respectively. The committee considered the University best equipped for this work.

This report constitutes the first phase of work proposed by the Department of Agricultural Economics. It includes description and preliminary appraisal of economic, technical, and institutional factors that influence the marketing of Minnesota milk and milk products. Besides providing a synthesis of information on Minnesota dairy marketing, the report suggests important dairy marketing research needs in the state.

Future research on the project will concentrate on various aspects of dairy marketing including the demand and consumption of Minnesota dairy products, dairy prices, milk transportation, milk market regulation, and market barriers.

In general, research is planned which should prove helpful in widening markets for Minnesota dairy products.
MINNESOTA IS FURTHER FROM THE LARGE MILK-CONSUMING MARKETS than any other major milk-producing state. Its costs of transporting milk products to these large markets are often higher than costs of many other areas. Therefore, Minnesota is a residual producer for commercial markets of most dairy products although it ranks third in total milk production and is a low-cost production area. For example, Minnesota produces more nonfat dry milk than any other state, but its commercial sales of this product are smaller than sales of several other states. The only fluid markets continually supplied by Minnesota producers are local markets. Other markets receive fluid milk from Minnesota only when local supplies are short.

However, commercial markets for Minnesota’s milk and milk products are influenced by important factors other than transportation costs. State milk control laws and federal milk regulations often restrict markets for milk and milk products. Various proposals for improving marketing conditions and consumption have been advanced.

This report provides a general overview of marketing problems confronting Minnesota’s dairy industry. Purposes of this report are:

1. To review and evaluate factors that directly and indirectly influence commercial markets for Minnesota dairy products.

2. To evaluate possible methods for enlarging commercial markets for these products.

3. To suggest additional research needs of the industry.

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Dairying In Minnesota

The importance of dairying as a farm enterprise in Minnesota is illustrated by the large number of farmers who have this enterprise and the income generated from it. In 1964, three-fifths of the 122,044 farms in Minnesota had cows for milk. Farm sales of milk and cream, amounting to over $311 million in 1963, annually account for slightly over 20 percent of cash receipts from farm marketings. Moreover, the dairy manufacturing and processing industry in Minnesota annually adds over $100 million to the farm value of dairy products as they move into trade channels.

The nature and importance of Minnesota's contribution to the national dairy industry are partly revealed by the following data: Minnesota's dairymen annually produce over 8 percent of the U.S. milk supply. In 1964 this amount was about 11 billion pounds of a national production of 126.6 billion pounds. A large proportion of Minnesota's production is manufactured into butter and nonfat dry milk; it moves into trade channels in these forms. In recent years, Minnesota's production of butter and nonfat dry milk accounted for about one-fourth of the national production. So Minnesota dairymen have a vital interest in any national developments that affect marketing of dairy products.

Since World War II, numerous factors have called for extreme reorganization and adjustment in Minnesota farming, particularly dairying. Increasing costs, changing production technology, and comparatively low prices have had far-reaching effects on the dairy industry. Generally, adjustments have been in the direction of greater specialization and fewer but larger and more efficient dairy enterprises.

Milk production in Minnesota has grown over time and become increasingly concentrated in the "dairy belt." In recent years these 39 counties, extending from the southeast to the northwest, accounted for about 71 percent of Minnesota's total milk production (see the figure). This amount compares with 61-62 percent produced in this area during the late 1930's and early 1940's. Accompanying this concentration of milk production has been a decline in the number of milk cows and small dairy herds. The total number of dairy cows, which reached a high of 1,748,000 in 1943, has declined to three-fourths of that number or about 1,270,000. The number of farms with milk cows declined from 134,000 in 1950 to approximately 71,000 in 1964.

But, at the same time, farmers have shifted to larger herds. Between 1955 and 1964, the number of herds with 20 or more cows increased from 12,723 to 23,947. These herds accounted for only 10 percent of the herds in Minnesota in 1955 but for 34 percent in 1963.

Many changes taking place in Minnesota's dairy industry are mirrored by changes at the link in the marketing chain between the

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1 All data for the United States in this publication do not include Hawaii and Alaska.
Milk production in Minnesota, 1964.

Each dot represents 10 million pounds of milk production.
farm and processing plant. The use of bulk tanks, introduced comparatively few years ago, has expanded rapidly in both fluid milk and manufacturing areas. Available data strongly suggest that Minnesota is a leader in adopting this method of handling milk.

Another change has been the rapid shift to whole milk deliveries rather than farm-separated cream. In 1950, only 51 percent of plant receipts of butterfat in Minnesota were for whole milk. By 1962, plant receipts in whole milk form reached 93 percent. Still another change has been the increasing proportion of farm production entering commercial trade channels. During the 1940's, approximately 10 percent of the butterfat production in Minnesota was retained on the farm. By the early 1960's, 96 percent of the production on farms moved into commercial channels.

Prices received by Minnesota farmers for milk reached a high in 1944-53 (see appendix table 1). Since then, prices have fluctuated around $3.20 per hundredweight (cwt.). However, milk prices were more stable than other livestock product prices in the 1954-63 period.

The position of milk prices relative to other livestock product prices has changed significantly over the long run (see appendix tables 1 and 2). Prices of all livestock products rose to their highest during 1944-53. Cattle and calf prices have held or increased slightly since that time. Milk, hog, and poultry product prices have decreased.

Quantities of these livestock products equal in value to 100 pounds of milk are listed in appendix table 2. These relationships are important for farm production decisions. Data show that these price relationships are moving in favor of beef cattle. A shift from hogs, poultry, and dairy to beef cattle production would be expected in the absence of other adjustments such as new production techniques and a higher proportion of beef breeds in cattle marketings. But major shifts in production have not occurred. Therefore, these other adjustments have tended to offset the price advantage of beef.

Minnesota milk prices relative to other parts of the United States are illustrated by price ratios in appendix tables 3 and 4. This ratio of Minnesota wholesale milk prices to U.S. wholesale prices has decreased over the long run. Minnesota's price was 86 percent of the U.S. average in 1934-43 but fell continually to 78 percent in 1963.

Minnesota prices for milk show different trends when classified into manufacturing grade milk and milk eligible for fluid distribution. Fluid prices have held at about 80 percent of the national average since 1950. Minnesota manufacturing grade milk prices, as a percent of the national average, rose from about 90 percent in the early 1950's to 99 percent in 1962 and 97 percent in 1963.

These price ratios show that, in order for the Minnesota-U.S. price ratio for all milk to have fallen, the proportion of Minnesota milk sold in fluid markets must have fallen relative to the U.S. average. But why has this state not participated in proportion to other milk-producing areas in fluid milk markets? Implications of these changes, and causes for them, will be proposed in this report.
Dairy Processing And Marketing

Products Manufactured

About 85 to 90 percent of the milk produced in Minnesota moves into marketing channels as manufactured dairy products. Over the years, production of most of these products has increased. But, production of a few products has declined, even though milk production in the state has increased.

The magnitude of the change in the production of milk and some manufactured products is indicated in table 1. Major increases in the production of several manufactured products occurred between 1946-49 and 1960-63. Butter production increased by 52 percent; production of nonfat dry milk for human consumption more than tripled. Frozen desserts and cottage cheese also showed significant increases over 1946-49 levels of production. Ice cream production increased 22 percent and ice milk production increased by 30 times. Production of sherbet increased by nearly 6 times. Cottage cheese production increases ranged from 84 percent for plain curd to about 150 percent for creamed cottage cheese.

The production of American cheese varieties in Minnesota during 1960-63 was 5 percent over the 1946-49 level. However, since production during 1950-54 was 4 percent over 1946-49, recent gains reflect a recovery from the 1955-59 period when production dropped to 87 percent of the 1946-49 level.

Production of dry whole milk and condensed and evaporated milk in the state has declined over the years. Production of dry whole milk in 1960-63 was 36 percent of the 1946-49 level; production of skimmed condensed and skimmed evaporated milk declined to 33 percent of the 1946-49 level. By 1955-59, the most recent period for which data are available, production of unskimmed condensed and evaporated milk declined to 65 percent of the 1946-49 level.

Data concerning production of fluid milk products have not been available on a continuing basis for Minnesota. However, a 1958 study of grade A fluid milk developments revealed that about 1,038.6 million pounds of milk in the state were packaged or bottled as fluid milk products (14). An additional 24.9 million pounds of milk were sold in bulk in out-of-state markets. In 1963, 690.3 million pounds of fluid milk were processed in plants serving the Twin Cities metropolitan area. As this and other areas have grown in population, the amount of fluid milk processed has expanded to meet the increased demand.

A comparison between Minnesota and the United States of relative rates of change in production of some manufactured dairy products is presented in table 2. These data reveal that, since 1946-49, production of milk, milkfat, butter, nonfat dry milk, and frozen desserts increased at a relatively more rapid rate in Minnesota than for the whole United States. But, even though production of American and cottage cheese increased
Table 1. Average production of milk, milkfat, and selected dairy products; Minnesota, 1936-63; with comparisons based on 1946-49 = 100 percent

<table>
<thead>
<tr>
<th>Period</th>
<th>Milk</th>
<th>Milkfat</th>
<th>Butter</th>
<th>American cheese</th>
<th>Cottage cheese</th>
<th>Dry whole milk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Million</td>
<td>Million</td>
<td>Thousand</td>
<td>Thousand</td>
<td>Curd</td>
<td>Thousand</td>
</tr>
<tr>
<td></td>
<td>pounds</td>
<td>pounds</td>
<td>pounds</td>
<td>pounds</td>
<td></td>
<td>pounds</td>
</tr>
<tr>
<td>1936-40</td>
<td>8,026</td>
<td>299</td>
<td>297,564</td>
<td>133</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>1941-45</td>
<td>8,724</td>
<td>314</td>
<td>284,085</td>
<td>127</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>1946-49</td>
<td>8,352</td>
<td>301</td>
<td>223,761</td>
<td>100</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>1950-54</td>
<td>8,260</td>
<td>295</td>
<td>235,270</td>
<td>105</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>1955-59</td>
<td>9,505</td>
<td>336</td>
<td>308,129</td>
<td>138</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>1960-63</td>
<td>10,284</td>
<td>363</td>
<td>341,067</td>
<td>152</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>1963</td>
<td>10,245</td>
<td>364</td>
<td>346,978</td>
<td>155</td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Period</th>
<th>Nonfat dry milk, human food</th>
<th>Ice cream</th>
<th>Ice milk</th>
<th>Milk sherbet</th>
<th>Condensed and evaporated milk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Thousand pounds</td>
<td>Thousand gallons</td>
<td>Thousand</td>
<td>Thousand</td>
<td>Skimmed</td>
</tr>
<tr>
<td></td>
<td>Per-</td>
<td>Per-</td>
<td>Per-</td>
<td>Per-</td>
<td></td>
</tr>
<tr>
<td>1936-40</td>
<td>12,201</td>
<td>7</td>
<td>*</td>
<td>79</td>
<td>14,228</td>
</tr>
<tr>
<td>1941-45</td>
<td>93,452</td>
<td>53</td>
<td>*</td>
<td>536†</td>
<td>35,013</td>
</tr>
<tr>
<td>1946-49</td>
<td>176,538</td>
<td>100</td>
<td>*</td>
<td>136</td>
<td>50,181</td>
</tr>
<tr>
<td>1950-54</td>
<td>199,752</td>
<td>113</td>
<td>136</td>
<td>961</td>
<td>16,674</td>
</tr>
<tr>
<td>1955-59</td>
<td>420,832</td>
<td>238</td>
<td>1,508</td>
<td>361</td>
<td>11,965</td>
</tr>
<tr>
<td>1960-63</td>
<td>546,925</td>
<td>310</td>
<td>4,200</td>
<td>857</td>
<td>16,542</td>
</tr>
<tr>
<td>1963</td>
<td>572,959</td>
<td>325</td>
<td>5,500</td>
<td>940</td>
<td>22,946</td>
</tr>
</tbody>
</table>

*Data not available.
†Data not available for some years.
‡Production was 1,385,000 gallons in 1945.
Source: (49) (33).
Table 2. Index of average production of milk, milkfat, and selected dairy products; Minnesota and United States, 1936-63; with comparisons based on 1946-49 = 100 percent

<table>
<thead>
<tr>
<th>Period</th>
<th>Milk</th>
<th>Milkfat</th>
<th>Butter</th>
<th>American cheese</th>
<th>Cottage cheese</th>
<th>Curd</th>
<th>Creamed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Minn.</td>
<td>United States</td>
<td>Minn.</td>
<td>United States</td>
<td>Minn.</td>
<td>United States</td>
<td>Minn.</td>
</tr>
<tr>
<td>1936-40</td>
<td>96</td>
<td>86</td>
<td>99</td>
<td>90</td>
<td>133</td>
<td>116</td>
<td>27</td>
</tr>
<tr>
<td>1941-45</td>
<td>104</td>
<td>101</td>
<td>104</td>
<td>102</td>
<td>127</td>
<td>127</td>
<td>63</td>
</tr>
<tr>
<td>1946-49</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>1950-54</td>
<td>99</td>
<td>102</td>
<td>98</td>
<td>100</td>
<td>105</td>
<td>104</td>
<td>104</td>
</tr>
<tr>
<td>1955-59</td>
<td>114</td>
<td>107</td>
<td>112</td>
<td>102</td>
<td>138</td>
<td>108</td>
<td>87</td>
</tr>
<tr>
<td>1960-63</td>
<td>123</td>
<td>108</td>
<td>120</td>
<td>102</td>
<td>152</td>
<td>113</td>
<td>105</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Period</th>
<th>Dry whole milk</th>
<th>Nonfat dry milk, human food</th>
<th>Ice cream</th>
<th>Ice milk</th>
<th>Milk sherbet</th>
<th>Condensed and evaporated milk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Minn.</td>
<td>United States</td>
<td>Minn.</td>
<td>United States</td>
<td>Minn.</td>
<td>United States</td>
</tr>
<tr>
<td>1936-40</td>
<td>*</td>
<td>13</td>
<td>7</td>
<td>37</td>
<td>47</td>
<td>47</td>
</tr>
<tr>
<td>1941-45</td>
<td>66</td>
<td>79</td>
<td>53</td>
<td>72</td>
<td>60</td>
<td>71</td>
</tr>
<tr>
<td>1946-49</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>1950-54</td>
<td>51</td>
<td>71</td>
<td>113</td>
<td>136</td>
<td>90</td>
<td>94</td>
</tr>
<tr>
<td>1955-59</td>
<td>9</td>
<td>62</td>
<td>238</td>
<td>215</td>
<td>107</td>
<td>106</td>
</tr>
<tr>
<td>1960-63</td>
<td>36</td>
<td>55</td>
<td>310</td>
<td>277</td>
<td>122</td>
<td>114</td>
</tr>
</tbody>
</table>

* Data not available.
Source: Calculated from data in table 1.
in the state, the comparative rate of increase was not as rapid as for the entire United States. Production of dry whole milk and condensed and evaporated milk declined at a faster rate in Minnesota than was the case for U.S. production.

Some factors that possibly underlie changes in these production patterns are presented later in this report. However, it should be noted that production of such items as cottage cheese, frozen desserts, and fluid milk tend to be coordinated with fairly local market needs. On the other hand, butter and nonfat dry milk are mainly produced for nationwide markets. And since returns from butter and nonfat dry milk tend to be lower than from several other products, milk is converted to butter and nonfat dry milk when other needs have been met. So expanded milk supplies tend to move into butter and nonfat dry milk production, as is the case in Minnesota.

Production of dry whole milk and condensed and evaporated milk in Minnesota has apparently been hampered by a declining demand for these products in national and international markets. In addition, some interregional shifts in production of these items within the United States have occurred.

Industry Organization And Changes

The dairy processing industry in Minnesota, like farming, has greatly changed in recent decades. In farming, improved production practices and technology have led to a concurrent decrease in the number of farms and an increase in production per farm. Similarly, improvements in transportation and processing technology have contributed to a reduction in the number of dairy plants and increased production per plant.

Butter Manufacturing

An idea of the change in Minnesota creameries can be gained from table 3. The drop from 874 creameries in Minnesota in 1938 to 347 in 1962 was accompanied by an increase in average butter production per plant from 345,800 pounds to over 1 million pounds. These trends are likely to continue for some time.

Much of the change in Minnesota's creamery industry has occurred because of improvements in dairy processing technology. These improvements have led to installation of such items as large capacity churns and separators, high temperature-short time pasteurization units, and inplace cleaning methods. Although this equipment requires a high initial capital investment, it can reduce per unit costs if a sufficient volume of milk is available. The milk supply potentially available to any plant also has increased because of rapid improvements in trucks and roads as well

On January 1, 1965, there were 575 dairy plants in Minnesota. These were owned by 521 firms, so the industry is mainly characterized by the single unit firm.
Table 3. Number of creameries, total butter production, and average butter production per creamery, Minnesota, selected years

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of creameries</th>
<th>Total butter manufactured</th>
<th>Average manufactured per plant</th>
</tr>
</thead>
<tbody>
<tr>
<td>1928</td>
<td>856</td>
<td>273,397</td>
<td>319,400</td>
</tr>
<tr>
<td>1938</td>
<td>874</td>
<td>301,604</td>
<td>345,800</td>
</tr>
<tr>
<td>1955</td>
<td>550</td>
<td>281,176</td>
<td>511,200</td>
</tr>
<tr>
<td>1962</td>
<td>347</td>
<td>353,355</td>
<td>1,018,300</td>
</tr>
</tbody>
</table>

Source: (17).

as the use of farm bulk tanks. So these developments have made it economically feasible for virtually every Minnesota creamery to gather milk from greater and greater distances.3

Transportation and processing improvements have greatly increased competitive pressure for available milk supplies. Precisely what factors permitted some creameries to survive the competitive struggle and forced others to close are not positively known. Unquestionably, costs were important factors. Since large creameries generally have lower costs than do small ones, they were able to survive and grow while many small creameries had to close.

But even though large plants and large volumes tend to lead to low costs, it is not inevitable that they do so. Alert management must make effective use of plants and equipment. Alert management also must evaluate changing conditions and plan and provide for them. Some important changes that have affected the creamery industry, in addition to changing transportation and processing technology, are described below. The success with which creameries adjusted to these changes largely depended upon the management involved. However, many boards of directors decided to close their plants because they no longer served a useful purpose — members could be better served by a neighboring plant.

The pronounced shift from farm-separated cream to the delivery of whole milk during the 1940's and early 1950's greatly affected creameries. This change meant that a large additional investment in plant equipment was required. Without this equipment, many plants saw their volume dwindle and their costs rise. Other plants closed because management felt it could not afford the necessary changes. In areas where farmers shifted to other farm enterprises, some creameries found that decreased butterfat receipts resulted in a cost structure so high that successful operation was no longer possible.

The upgrading of sanitary requirements also influenced decisions of some boards of directors to close their doors. Frequently, the high cost of making necessary improvements made recovery of the needed outlay

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3For additional discussion of economies of large size dairy plants see: (23), (22), and (46).
In addition to the trend to fewer and larger butter manufacturing plants, there has been a trend to increasing concentration of butter manufacturing in larger plants (see table 4). Not only have these plants increased their "share" of the butter produced in Minnesota, they have also become increasingly predominant in the industry.

Data in table 4 indicate a pronounced increase in the importance of large plants in butter manufacturing. In 1962, each group of plants, although of equal size in proportionate terms, actually contained fewer plants than in 1938. But in spite of the fewer number of firms comprising the top 10 and the second 10 percent, these groups showed a proportionate increase in the butter manufactured.

The increasing predominance of large creameries in the state likely hinges on the economies of operating large volume plants. Large volumes permit lower costs which, in turn, improve the position of large plants when competing for available milk supplies. Whether this trend will continue probably depends on costs involved. Still larger volume plants will likely permit continued reduction of operating costs. But at some point the higher cost of transporting milk greater distances should offset the lower cost of plant operation. At what point and under what conditions this will take place are not known; this problem has not been studied under existing operating conditions in the state.

The declining number of creameries manufacturing butter and the increasing predominance of large plants have been accompanied by the increasing importance of the cooperative business organization. Again, comparing the situation in 1962 with that in 1938, the proportion of Minnesota creameries organized as cooperatives increased from 72 to 88 percent. Of the butter manufactured in the state, cooperatives increased their share from 72 to 89 percent (17).

This discussion emphasizes the changes taking place in the number of plants that manufacture butter and the volume per plant. However, concentrating attention exclusively on butter production often leads to an oversimplification of the actual situation. Many organizations that

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Table 4. Proportion of butter manufactured in Minnesota by plants ranked according to size, 1938 and 1962

<table>
<thead>
<tr>
<th>Plant size groups</th>
<th>1938</th>
<th>1962</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top 10 percent</td>
<td>33.0</td>
<td>42.9</td>
</tr>
<tr>
<td>Second 10 percent</td>
<td>16.3</td>
<td>17.7</td>
</tr>
<tr>
<td>Third 10 percent</td>
<td>12.6</td>
<td>11.5</td>
</tr>
<tr>
<td>Bottom 70 percent</td>
<td>38.1</td>
<td>27.9</td>
</tr>
<tr>
<td>All groups</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

through continued operation unlikely.

Preliminary work in the area of optimum size plant and procurement areas is the subject of a thesis (45).
manufacture butter also engage in other dairy and nondairy operations. For example, in 1962, 67 Minnesota plants manufactured dried milk products (primarily dried skim milk) in addition to butter. Three plants manufactured cheese and four plants manufactured both dried products and cheese as well as butter. Some plants also processed fluid milk. The viability of those organizations is conditioned not so much by the quantity of butter manufactured as by the size and efficiency of overall operations.

As a practical matter, plants that are most important in terms of butter manufactured also tend to be most important in the manufacture of other dairy products. For example, in 1962, 74 Minnesota plants produced dried milk products. Of these plants, 40 were among the 50 largest plants in the state when measured by butter production. Twelve of these 40 were also among the 20 largest producers of dried milk products. These data suggest that when all dairy products are considered, the predominance of the large dairy processing plant is even greater than that indicated in table 4.

**Dried Milk Products Manufacturing**

Production of large quantities of dried milk products is a comparatively recent development in Minnesota's dairy industry. Some dried products were produced in the state during the 1920's and 1930's, but World War II set the stage for rapid expansion. During the war, the government offered special price and financial incentives to obtain increased supplies for wartime needs. The average annual production of 224 million pounds of dried milk products during the late 1940's was a six-fold expansion over the late 1930's.

During the 1950's and early 1960's, production expanded as production of milk increased and as farmers shifted to delivery of whole milk to plants. In 1963, production of nonfat dry milk in the state was 570 million pounds—about three times the late 1940's level. The future rate of expansion in nonfat dry milk will be limited by the expansion of milk production in the state because dairymen have virtually completed the shift to delivery of whole milk.

Organization of dry milk manufacturing in Minnesota, like butter manufacturing, has considerably changed since the late 1930's. During the 1930's about 20 Minnesota plants manufactured nonfat dry milk solids. By 1945 the number had increased to 141 (31). Expansion took place along two lines. During the 1940's, about 20 specialized, large-volume, spray drying plants were established. These plants were devoted exclusively to drying skim milk received from several nearby creameries. The other major aspect of expansion was installation of roller process drying in some existing plants. The roller process, compared to the spray process, has small capacity. In addition, powder produced by the roller process sells at a considerable discount.

By 1950, only 68 plants manufactured nonfat dry milk products—largely because several roller process operations were discontinued. But
even though the number of plants declined, manufacturing capacity expanded. During the 1950's, some large butter manufacturing plants installed spray drying equipment because lower cost, smaller capacity spray drying equipment became available and government purchase of nonfat dry milk solids for price support purposes appeared likely to continue. In addition, a number of plants that had installed roller process equipment shifted to spray equipment.

At the present time, some of the 71 plants now operating retain their primary local identity and place major reliance upon whole milk received directly from producers. These plants produce both butter and nonfat dry milk solids. Another group of plants specialize in production of nonfat dry milk and receive skim milk from local creameries. Still another group of plants receive large quantities of whole milk as well as skim milk. Some whole milk is received from creameries that converted to milk-receiving stations; some is received direct from producers. Skim milk is received from area creameries.

Cheese Manufacturing

Minnesota production of American varieties of whole milk cheese reached a high of 63.5 million pounds in 1953. By 1959, production declined to 41.1 million pounds but has been increasing rapidly in recent years. Production in 1964 was about 61.8 million pounds, still somewhat below the 1953 record.

Manufacture of cheese in Minnesota, like most dairy products, has become increasingly concentrated in fewer plants. After an expansion during the late 1930's and early 1940's, 109 plants in 1945 manufactured whole milk cheese compared to 84 in 1935. But, in recent years, the number of plants has varied between 17 and 20.

Several factors contributed to this rapid decline. Many plants that moved into cheese production during the late 1930's withdrew during the late 1940's. Since that time the fairly fixed relationship between levels of price support for butter and nonfat dry milk as compared to cheese has been mainly to the disadvantage of cheese production. As economies of largescale butter and nonfat dry milk manufacturing have been increasingly realized, the fixed price relationship has tipped the advantage in procuring milk supplies to the butter-powder plants. Apparently, some cheese plants have successfully offset this disadvantage by developing special markets for both their cheese and their whey. However, such opportunities are generally available only to large plants.

Fluid Milk Processing and Distribution

About 1.2 billion pounds of milk—about 10 percent of the milk produced—were processed and distributed as fluid milk products in Minnesota in 1962 (13). Data on the amount of fluid products produced are not available on a continuous basis but production of these products has undoubtedly increased as population has grown.
Like other segments of the dairy processing industry, the number of organizations processing and distributing fluid milk has declined. In 1962 there were 161 plants compared to 289 in 1956. Of the 161 plants in 1962, about three-fourths of them were rated as grade A plants as compared to about one-half of the plants operating in 1956 (13).

Large fluid milk processors and distributors have become increasingly predominant in the industry. In 1962, the 27 plants that processed over 10 million pounds of milk per year handled nearly 80 percent of the total volume of business in the state. But these plants accounted for only 17 percent of those plants in operation (13).

Factors contributing to the trend toward fewer and larger plants have been: improvements in highway transportation, refrigeration, and milk quality; and adoption of the single-service paper containers. These factors have made it possible for individual distributors to serve larger areas. Aggressive firms have expanded distribution into trade areas of smaller plants, forcing many of them to close.

In addition, home deliveries of milk have decreased as consumers have shifted their milk purchases to grocery stores. Much grocery retailing is through chain stores that often arrange to purchase all of their milk through a single purchasing department. Many small distributors cannot compete for these accounts.

The intense rivalry for fluid milk sales frequently erupts into price wars, particularly when a distributor attempts to enter a new market or when some distribution innovation is introduced. The result has been increased state regulation of competitive practices.

**Marketing Channels**

Various channels exist for moving milk from producers to consumers — some are direct, some involve several intermediate handlers. Marketing channels for fluid milk products are generally better known than for other dairy products, partly because fluid milk markets are more restricted geographically. Manufactured products move throughout the nation, making it difficult to follow them as they move to consumers.

Within each fluid market, several marketing channels may be operating. At times, functions of milk production, processing, bottling, and distribution to consumers are vested in one individual or firm. Distribution takes place on retail milk routes. Many rural communities and some major metropolitan markets are serviced by such integrated distributors.

Cooperatives play an important role in movement of fluid milk from producers to consumers. In 1962, 84 percent of all milk in 69 federal order milk markets was controlled by cooperatives (29). Some cooperatives are completely integrated from milk assembly to distribution of fluid products on wholesale and retail routes.

Other cooperatives are bargaining associations. In many large metropolitan markets, they bargain for the milk price and perform other marketing services. They may arrange for milk hauling and have the milk
delivered to the processor-distributor. Or, processor-distributors may have their own milk assembly organization. The bargaining cooperative may also arrange for processing surplus milk by local manufacturing milk plants.

Operating cooperatives perform many functions in fluid milk markets. However, they are not usually engaged in fluid milk distribution. They assemble milk, bargain for a price with processor-distributors, and often deliver milk to them. Surplus milk is processed into butter, powder, or cheese by the cooperative. In some markets, the cooperative bottles milk for distributors.

Processor-distributors perform the bottling or packaging operations and distribute the milk on retail or wholesale routes. National dairy concerns are important in this phase; the four largest national dairy concerns accounted for 25.8 percent of the nation's bottled fluid milk and cream in 1958. However, they are not this important in Minnesota.

The retail store is now the dominant form of distribution to consumers. Minneapolis-St. Paul had 27 percent of its fluid milk sold on retail routes and 73 percent on wholesale routes to retailers or the institutional trade in November 1961. Channels for moving ice cream and its component milk ingredients from milk producers to consumers are quite similar to fluid milk channels. Fluid milk and cream used in ice cream are purchased in the same channels where processor-distributors purchase milk for fluid use. Nonfat dry milk, now an important ingredient of ice cream, is generally purchased directly from manufacturers of nonfat dry milk. Some unsalted butter is used in place of cream in milk-deficit regions; this butter is purchased in channels that are discussed later.

Ice cream manufacturers sell most ice cream to retailers. Only a small proportion, 3.22 percent in 1956, is retailed by processors themselves (8). In recent years, food stores have become the dominant retail distributor, accounting for almost 50 percent of all sales of ice cream in 1956 (8). Drug stores and eating establishments accounted for about 25 percent of all sales in that year. In the 1930's, drug stores, confectionery stores, and cigar stores accounted for almost 60 percent of sales (8).

Marketing channels for dairy products other than fluid products and ice cream are varied and complicated. In a study of cheese marketing in Wisconsin, 12 lots of cheese were traced from the factory to the ultimate retailer. There were as many combinations of channels as there were lots of cheese (11).

There is more specializing of marketing functions for cheese than for fluid products and ice cream. In some cases, each function is performed by a specialized firm. These functions are: cheese manufacturing, assembly of cheese from manufacturing plants, processing or packaging, wholesaling, jobbing, and retailing.

Manufacturing is performed by many plants in the upper Midwest.

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*Data supplied by Milk Market Administrator, Minneapolis-St. Paul Federal Order Milk Market.*
Some plants are of firms completely integrated from manufacturing cheese to selling packaged cheese to retail stores.

Many factories do not perform any additional functions. Cheese from these factories is purchased by cheese assemblers; approximately 60 cheese assemblers were in the United States in 1959 (11). Some assemblers sell to packagers of cheese or processors of "process cheese," "process cheese foods," and "cheese spreads." Assemblers may sell to food chains which have their own slicing and packaging operations. Some assemblers are integrated through processing, packaging, wholesaling, and jobbing. Wholesaling of cheese is often tied to another marketing function. In fact, the dominant firms in cheese wholesaling are integrated from assembly through processing and wholesaling.

A large amount of the jobbing to retail food stores is now done by the warehousing organization of the national food chains. Food wholesalers often job to the small independent stores.

The marketing channels for butter are also quite involved and varied. Much U.S. butter is produced by a large number of relatively small creameries. Only a few large creameries have a brand name and sell directly to retail stores or chains and food processors which use butter as an ingredient.

Important primary receivers of butter from creameries are cooperative sales agencies, chain stores, wholesalers, meat packers, and national dairy companies. Wholesale butter houses are important intermediate handlers of butter. These organizations print and package butter under private labels for many outlets. They also move butter to bakers and to ice cream manufacturers who use unsalted butter as a source of fat. Some assemblers also sell to or act as commission firms to butter printing houses in major metropolitan markets.

Chain stores have been large first receivers of butter in Minnesota. In 1949, about 16 percent of the butter in Minnesota was shipped directly to chain stores (10). Chain stores are now probably more important as first receivers of butter.

Meat packers, once very large in churning, assembling, printing, and wholesaling of butter, have decreased in importance.

Nonfat dry milk has fewer intermediate handlers than do other manufactured dairy products. In 1963, 87.5 percent of all commercial sales of nonfat dry milk was packaged for home use by the processor or sold directly to industrial users (1). However, commission firms may have facilitated some sales.

Nonfat dry milk differs from other manufactured dairy products because its main use is other than direct home use. Only 28.5 percent of all domestic sales of nonfat dry milk was sold for packaged home use in 1963 (1). Bakeries, other dairy processors, meat processors, and prepared dry mix manufacturers were big users, accounting for 63.3 percent of all domestic nongovernment use (1). The most important buyer of nonfat dry milk is the government. It purchased more than 50 percent of all powder in the last decade.
Forces Important In Shaping The Minnesota Dairy Industry

In addition to major technological changes, two categories of forces have greatly affected—and probably will continue to affect—Minnesota’s dairy industry since World War II:

1. Major changes in food consumption.
2. Government programs for the dairy industry.

Changing Demand For Food Products

General Consumption Changes

Concern over the relationship between health and food is growing. Overweight and the relationship between animal fat and heart disease are frequently mentioned problems. The increase in sedentary occupations has reduced caloric requirements and fat intake. So per capita consumption of milkfat, a high calorie food, has greatly decreased.

Emphasis on improved nutrition is also growing and high levels of income and education provide the means and knowhow for selecting a nutritionally good diet. But an adequate diet can be achieved with different combinations of food. The food selected depends largely on family income.

The composition of diets by food groups is generally changing. Per capita consumption of processed fruits and vegetables, meat, fish, and poultry is increasing. Consumption of dairy products, cereal products,
and potatoes is decreasing. Per capita use of fats and oils is remaining relatively stable—43.5 pounds in 1940-45 and 45.4 pounds in 1960—but a large substitution of margarine for butter and vegetable shortening for lard is occurring (50). These changes result from a composite of factors. Increasing family income, an important cause, permits consumers to reflect preferences for certain foods at the expense of those less preferred.

Increases in marketing services and decreases in home-produced foods are important developments in food consumption. Competition with homemaking tasks for women's time creates a demand for convenience foods. The increase in marketing services is largely represented by more "prepared foods" in the family food basket. Therefore, the decision of what food ingredients to use falls to food processors. Where the housewife may have used milk and butter as ingredients, the processor may use vegetable fat and nonfat dry milk or dried buttermilk.

The Demand for Dairy Products

U.S. per capita consumption of milk equivalent of all milk products decreased from 691 pounds in 1953 to 636 pounds in 1962 (see table 5). This 8-percent decrease largely offset the increase in total domestic disappearance which resulted from population growth. The impact of the decline in national per capita consumption on markets for Minnesota dairy products can be misleading. Per capita consumption data of various dairy products are presented in table 6. Only 4 of the 19 products—fluid whole milk, cream, butter, and evaporated milk—showed an apparent decrease in per capita consumption from 1953 to 1962. Five of the 19—skim milk or lowfat items, cheese, ice milk, cottage cheese, and nonfat dry milk—exhibited apparent increases. However, the decline in butter consumption is most important to the Minnesota dairy industry.

Per capita consumption of cheese increased from 7.5 pounds in 1953 to 9.2 pounds in 1962. Minnesota is not a major cheese-producing state but the trend may indicate needed adjustment in this direction.

Consumption increases for skim milk and low fat items are not as important as changes for manufactured dairy products to Minnesota's dairy industry; only about 10 percent of the state's milk is processed into fluid items. Of course, for producers around the Twin Cities and a few other large fluid markets, increased consumption is important.

Increases in skim milk and low fat fluid items in other markets do not have important direct effects on markets for Minnesota milk because participation in out-of-state fluid milk markets is limited. For example, total out-of-state fluid milk shipments to distant fluid markets from September 1960 through August 1961 were 26,565,000 pounds—less than one-half of 1 percent of all Minnesota milk marketings (6).

Increasing per capita consumption of frozen desserts and cottage cheese can broaden markets for farm-produced milk. Dry milk is often used for producing these products so increased consumption could mean a growing market for nonfat dry milk.
Table 6. Dairy products, per capita consumption, United States, 1953-62

<table>
<thead>
<tr>
<th>Year</th>
<th>Fluid milk and cream</th>
<th>Skim milk or low fat items</th>
<th>Butter</th>
<th>Cheese</th>
<th>Evaporated whole milk</th>
<th>Evaporated condensed skim milk</th>
<th>Condensed whole milk</th>
<th>Unsweetened</th>
<th>Sweetened</th>
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<td>29.4</td>
<td>8.5</td>
<td>7.5</td>
<td>15.4</td>
<td>4.8</td>
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<td>31.0</td>
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<td>9.0</td>
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<td>14.2</td>
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<tr>
<th>Year</th>
<th>Frozen desserts</th>
<th>Ice cream</th>
<th>Sherbet</th>
<th>Ice milk</th>
<th>Other frozen products</th>
<th>Cottage cheese</th>
<th>Nonfat dry milk</th>
<th>Dry whole milk</th>
<th>Dry buttermilk</th>
<th>Dry whey</th>
<th>Malted milk</th>
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<tr>
<td>1954</td>
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<td>1.4</td>
<td>2.6</td>
<td>0.2</td>
<td>3.8</td>
<td>4.5</td>
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<td>3.9</td>
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<tr>
<td>1956</td>
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<tr>
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<tr>
<td>1959</td>
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<tr>
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<td>6.2</td>
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<tr>
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<td>5.0</td>
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<td>6.3</td>
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<td>0.4</td>
<td>0.3</td>
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<td>1962</td>
<td>17.9</td>
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<td>5.6</td>
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<td>0.4</td>
<td>0.3</td>
<td>0.3</td>
<td>0.1</td>
</tr>
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</table>

Source: (49).
Minnesota has never been important in production of evaporated and condensed milk; therefore, changes in consumption of these products only indirectly affect the state.

Causes for the decline in milkfat consumption are clear. Of primary importance is the price relationship between butter and margarine in the absence of statutory restrictions on the sale, manufacture, or color of margarine. Many consumers see little difference between butter and margarine. So these consumers buy the product with the price advantage in the market place. Some consumers prefer butter over margarine but shift at some maximum price difference. When both products are available, any change in the price relationship shifts consumers at this maximum price difference from one product to another.

Butter-margarine price relationships are shown in table 7. The price of butter relative to margarine tended upward for most of 1954-62. So more consumers reached the price difference that caused them to shift from butter to margarine.

Butter rationing during World War II has been proposed as a major factor causing the shift from butter to margarine. However, per capita data on margarine consumption do not support this hypothesis. The increase in margarine consumption during 1941-45 was 1.3 pounds; 1946-50, 2.2 pounds; and 1951-55, 1.6 pounds (49). Thus, adjustments during other time periods were as large or larger.

Repeal of taxes on margarine sales and licenses for handling helps explain the continuing shift from butter to margarine. In 1950, the federal excise tax on margarine and license requirements for manufacturing, wholesaling, and retailing were repealed. In addition, many state laws that restricted sale of colored margarine have been repealed since 1940. State taxes and licenses on sales and handling of margarine have been

<p>| Table 7. Retail prices of butter and margarine, United States, 1953-62 |
|-----------------|-----------------|-----------------|-----------------|</p>
<table>
<thead>
<tr>
<th>Year</th>
<th>Retail butter price</th>
<th>Retail margarine price</th>
<th>Ratio: butter-margarine</th>
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</thead>
<tbody>
<tr>
<td>1953</td>
<td>79.0</td>
<td>29.4</td>
<td>2.69</td>
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<tr>
<td>1954</td>
<td>72.4</td>
<td>29.9</td>
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<td>1955</td>
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<td>29.4</td>
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<tr>
<td>1959</td>
<td>75.3</td>
<td>28.0</td>
<td>2.60</td>
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<tr>
<td>1960</td>
<td>74.9</td>
<td>26.9</td>
<td>2.73</td>
</tr>
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<td>76.3</td>
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<tr>
<td>1962</td>
<td>75.2</td>
<td>28.4</td>
<td>2.65</td>
</tr>
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</table>

Source: (49).
reduced or eliminated. Ladd (26) estimated that if the same states prohibiting the sale of colored margarine in 1935 had prohibited it in 1947-49, the 1947-49 per capita consumption of butter and margarine would have been 18.5 and 2.2 pounds, respectively, as opposed to averages of 10.4 and 5.6 for those years.

Concern over proper nutrition, weight control, and cholesterol have all exerted a downward pressure on butter and milkfat consumption. Substitute fats are taking milkfat markets not only from butter. Consumption and production of mellorine are increasing. Mellorine is a frozen dessert made with vegetable fat in place of butterfat. Fourteen states currently permit its sale. As an indication of mellorine's effect on the dairy industry, Texas produces more of it than ice cream (21). However, in Illinois and Oklahoma, its production decreased between 1956 and 1961 (21).

Total mellorine production, ice cream production, and mellorine as a percent of ice cream-mellorine production are presented in table 8. Data show that mellorine production is growing more rapidly than ice cream production. The cost reduction because of the use of vegetable fat gives mellorine an advantage over ice cream. The fat cost in mellorine was estimated at 15 cents less per half gallon than for ice cream (21).

Other products are also substituting for high fat dairy products. There are numerous coffee cream substitutes. Several substitute dessert toppings are available for use in place of whipping cream.

**Implications of Consumption Changes for Minnesota**

Consumption changes for manufactured dairy products are extremely important to Minnesota because a large proportion of its milk is used in

<table>
<thead>
<tr>
<th>Year</th>
<th>Ice cream</th>
<th>Mellorine</th>
<th>Percent mellorine of ice cream — mellorine production</th>
</tr>
</thead>
<tbody>
<tr>
<td>1952</td>
<td>592,705</td>
<td>11,188</td>
<td>1.85</td>
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<tr>
<td>1953</td>
<td>605,051</td>
<td>24,207</td>
<td>3.85</td>
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<td>1954</td>
<td>596,821</td>
<td>31,379</td>
<td>5.00</td>
</tr>
<tr>
<td>1955</td>
<td>628,525</td>
<td>32,261</td>
<td>4.88</td>
</tr>
<tr>
<td>1956</td>
<td>641,333</td>
<td>33,473</td>
<td>4.96</td>
</tr>
<tr>
<td>1957</td>
<td>650,583</td>
<td>34,161</td>
<td>4.99</td>
</tr>
<tr>
<td>1958</td>
<td>658,026</td>
<td>39,690</td>
<td>5.69</td>
</tr>
<tr>
<td>1959</td>
<td>698,931</td>
<td>42,399</td>
<td>5.72</td>
</tr>
<tr>
<td>1960</td>
<td>697,552</td>
<td>45,214</td>
<td>6.09</td>
</tr>
<tr>
<td>1961</td>
<td>694,712</td>
<td>48,025</td>
<td>6.47</td>
</tr>
</tbody>
</table>

Source: (21).
these products. Roughly 90 percent of all Minnesota farm marketings of milk is processed as manufactured dairy products. But high value manufactured products such as frozen desserts and cottage cheese account for less than 5 percent of all whole milk used in manufactured products.

The continuing decline in per capita consumption of butter limits the growth of this segment of the dairy industry. Perhaps the downward trend will level off but there are now no indications that it will. If it does, population increases may expand the market. But population increases have only offset the effect of declining per capita consumption on total disappearance of butter since 1940. Prior to 1940, total consumption was much larger. In the absence of market growth, expansion of the Minnesota dairy industry may require increased emphasis on other products or outlets.

Per capita cheese consumption is a bright spot in dairy product consumption. This trend, contrasted with that for butter, indicates a possible shift of Minnesota milk supplies into cheese production.

Unless foreign commercial markets show considerable expansion, increasing consumption of dry milk does not offer great immediate hope for the Minnesota dairy industry; dry milk already is in large surplus. More than 50 percent of nonfat dry milk production was purchased by the government for price support activities in the past decade. So commercial demand must greatly increase if dry milk is to become a more profitable product than it is now.

Projections of demands for butter, cheese, and nonfat dry milk are needed. Then analysis should be made of what adjustments are required in the Minnesota dairy industry. These projections are particularly important since investment decisions must be based not only on present conditions but also upon expected future demand.

Government Dairy Programs Since 1940

World War II programs and the present price support program have significantly affected the Minnesota dairy industry. A primary goal of the World War II dairy program was to increase output of nonfat dry milk, dry whole milk, evaporated milk, and cheese for lend-lease and military purposes. So some programs increased milk production and other programs altered existing utilization patterns for milk. An important part of the total program was diversion of nonfat solids from animal consumption to human consumption.

Stimulation of milk production was made by direct payments to producers. Payments were made for both whole milk and cream. But because milk solids were needed, payment for fat in whole milk sales was more favorable than for farm-separated cream.

Utilization of milk was regulated by several devices including limitations on the amount of milk solids used in frozen products and noncheddar cheeses (9). City milk distributors were also given quotas on deliveries of fluid milk, cream, cottage cheese, and buttermilk. Production
payments were made for cheese and butter so processors could compete for milk suppliers. Federal assistance in financing and certifying necessity was given cooperatives in building and expanding facilities.

Distribution of milk products was regulated. Set-aside orders required specified percentages of butter, powder, and cheese production held for sale to military, lend-lease, and wartime agencies. Rationing for equitable distribution of domestic supplies was instituted.

These programs had great impact on the Minnesota dairy industry. They were designed to expand the manufactured milk products industry which they did. In 1939, 15 percent of all milk sold to dealers and plants by Minnesota producers was in the form of whole milk. By 1946, this figure was 53 percent. Nonfat dry milk production in Minnesota in 1939 was 11.5 million pounds; in 1946, it was 197.3 million pounds. Cooperatives built several large milk drying plants in the state with government financing and priorities. Many dairy plants were enlarged with such assistance. Of course, these same developments may have occurred without the programs but not as quickly.

The price support program for manufacturing milk has maintained the growth of the manufacturing milk industry since World War II. Price supports, first authorized by the Steagall Amendment in 1941, were to remain in effect for 2 years after the war. Price supports were made mandatory at 90 percent of parity for specified nonbasic commodities including milk. Subsequent agricultural acts have continued price supporting activities although the minimum level of support is now 75 percent of parity. The support price is determined by the Secretary of Agriculture at the beginning of the marketing year.

The price for milk is supported through Commodity Credit Corporation (CCC) purchases or loans on milk and milk products. In practice, price support activities are carried on almost exclusively by purchase of nonfat dry milk, butter, and cheddar cheese. These products are purchased at prices which maintain prices received by farmers for milk at stated levels.

The impact of the price support program is felt primarily by manufacturing milk markets. Therefore, this program is important for maintaining prices to producers in manufacturing milk areas such as Minnesota. However, fluid milk market prices are indirectly supported because pricing formulas in many federal order milk markets are based on manufacturing milk prices.

The price support program for milk has apparently favored expansion of the butter-powder industry over cheese. The U.S. cheese industry grew 32 percent between 1945 and 1960. The butter-powder industry, as measured by output of nonfat dry milk, grew by 182 percent. This development occurred at the same time that total consumer demand for cheese grew at a greater rate than the butter demand. No doubt, growth of the Minnesota butter-powder industry would have been less in the absence of a price support program or with different relative levels of price support for butter and powder than for cheese.

Rojko (40) estimated the amount by which manufacturing milk
Table 9. Milk and dairy products: estimated percentage decreases in farm price below prevailing levels had no price support programs been in effect, United States, marketing years 1949-55

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Year beginning April 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manufacturing milk</td>
<td>8</td>
<td>2</td>
<td>-</td>
<td>12</td>
<td>32</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>All milk</td>
<td>7</td>
<td>2</td>
<td>-</td>
<td>10</td>
<td>26</td>
<td>13</td>
<td>13</td>
</tr>
</tbody>
</table>

Source: (40).

prices would have fallen without price support programs during 1949-55 (see table 9). Prices for manufacturing milk would have fallen 32 percent in 1953. In 1950, with the high demand brought on by the Korean War, the price would have dropped only 2 percent. Figures for all milk indicate that price support activities greatly affect all milk prices. Estimates indicate that farm income in Minnesota would materially decrease if price support programs are abandoned. Reductions in milk production probably would take place.

The price support program channels more milk into butter, nonfat dry milk, and cheese than would be the case if all were allowed to move through commercial channels at free market prices. Rojko estimated that only 60 percent of the whole milk equivalent of butter and cheese purchased by CCC for price support during 1949-55 would have gone into these products without the program (40). The remainder would have gone into fluid milk, other cheeses, evaporated milk, ice cream, and other dairy products.

Therefore, evidence points to a different utilization of milk in the absence of a price support program. What the industry would be emphasizing is difficult to determine without intensive analysis of supply and demand conditions.

The Federal Milk Marketing Order Program

Federal milk marketing orders have often been criticized by Midwestern dairy interests. An often voiced criticism—that may not always be justified—is that they have restrictive features which prevent Midwestern producers from sharing in higher milk prices. But federal milk marketing orders can be detrimental to Midwestern milk producers in more important ways.

The Size of the Federal Order Program and Characteristics of Its Growth

The federal order program has grown significantly since 1947. At that time, 15.6 percent of all milk marketed in the United States was regulated.
by federal orders (see table 10). In 1963, 52,868,147,000 pounds of milk—44.9 percent of all U.S. milk marketed by farmers—were regulated under federal marketing orders. The number of federally regulated market areas more than doubled during this same period (see table 11).

The purchase of milk is regulated in many major metropolitan milk markets by the federal order program. Other important metropolitan areas—in California, Pennsylvania, etc.—are often regulated by state milk control agencies.

The number of handlers under federal orders more than doubled during 1947-63 (see table 11). The proportion of all U.S. handlers under federal order regulations is quite large. In 1958, 5,008 establishments distributed fluid milk in the United States (55). In that year, 1,962 handlers were under federal orders, 39.2 percent of all distributing establishments.

Statutory Authority

Legislative authority for federal milk market orders is the Agricultural

### Table 10. Milk marketings in the United States and in federal order milk markets, 1947-63

<table>
<thead>
<tr>
<th>Year</th>
<th>Total receipts of milk under federal orders</th>
<th>Total milk marketed by all U.S. farmers</th>
<th>Percentage of total milk marketed by U.S. farmers regulated under federal order</th>
</tr>
</thead>
<tbody>
<tr>
<td>1947</td>
<td>14,980,301</td>
<td>96,418,000</td>
<td>15.6</td>
</tr>
<tr>
<td>1948</td>
<td>15,019,637</td>
<td>93,294,000</td>
<td>16.1</td>
</tr>
<tr>
<td>1949</td>
<td>17,049,170</td>
<td>97,473,000</td>
<td>17.5</td>
</tr>
<tr>
<td>1950</td>
<td>18,659,790</td>
<td>98,348,000</td>
<td>19.0</td>
</tr>
<tr>
<td>1951</td>
<td>20,116,620</td>
<td>96,748,000</td>
<td>20.8</td>
</tr>
<tr>
<td>1952</td>
<td>22,998,107</td>
<td>97,672,000</td>
<td>23.5</td>
</tr>
<tr>
<td>1953</td>
<td>25,895,718</td>
<td>104,109,000</td>
<td>24.9</td>
</tr>
<tr>
<td>1954</td>
<td>27,140,234</td>
<td>106,714,000</td>
<td>25.4</td>
</tr>
<tr>
<td>1955</td>
<td>28,948,067</td>
<td>108,320,000</td>
<td>26.7</td>
</tr>
<tr>
<td>1956</td>
<td>31,379,533</td>
<td>111,233,000</td>
<td>28.2</td>
</tr>
<tr>
<td>1957</td>
<td>33,455,338</td>
<td>112,247,000</td>
<td>29.8</td>
</tr>
<tr>
<td>1958</td>
<td>36,355,658</td>
<td>112,073,000</td>
<td>32.4</td>
</tr>
<tr>
<td>1959</td>
<td>40,149,083</td>
<td>111,953,000</td>
<td>35.9</td>
</tr>
<tr>
<td>1960</td>
<td>44,812,259</td>
<td>113,756,000</td>
<td>39.4</td>
</tr>
<tr>
<td>1961</td>
<td>48,802,558</td>
<td>117,007,000</td>
<td>41.7</td>
</tr>
<tr>
<td>1962</td>
<td>51,648,248</td>
<td>118,348,000</td>
<td>43.6</td>
</tr>
<tr>
<td>1963*</td>
<td>52,868,147</td>
<td>117,772,000</td>
<td>44.9</td>
</tr>
</tbody>
</table>

*Preliminary data.

Source: (52) and (49).
### Table 11. Number of federal order milk markets and producers and handlers under federal orders, United States, 1947-63

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of federal order milk markets</th>
<th>Number of producers delivering milk to handlers under federal order regulation</th>
<th>Number of handlers regulated under federal orders</th>
</tr>
</thead>
<tbody>
<tr>
<td>1947</td>
<td>29</td>
<td>134,091</td>
<td>991</td>
</tr>
<tr>
<td>1948</td>
<td>30</td>
<td>136,363</td>
<td>963</td>
</tr>
<tr>
<td>1949</td>
<td>33</td>
<td>142,995</td>
<td>966</td>
</tr>
<tr>
<td>1950</td>
<td>39</td>
<td>156,584</td>
<td>1,101</td>
</tr>
<tr>
<td>1951</td>
<td>44</td>
<td>172,327</td>
<td>1,343</td>
</tr>
<tr>
<td>1952</td>
<td>49</td>
<td>176,752</td>
<td>1,352</td>
</tr>
<tr>
<td>1953</td>
<td>49</td>
<td>183,479</td>
<td>1,308</td>
</tr>
<tr>
<td>1954</td>
<td>53</td>
<td>186,127</td>
<td>1,333</td>
</tr>
<tr>
<td>1955</td>
<td>63</td>
<td>180,611</td>
<td>1,483</td>
</tr>
<tr>
<td>1956</td>
<td>68</td>
<td>183,830</td>
<td>1,486</td>
</tr>
<tr>
<td>1957</td>
<td>68</td>
<td>182,551</td>
<td>1,889</td>
</tr>
<tr>
<td>1958</td>
<td>74</td>
<td>186,155</td>
<td>1,962</td>
</tr>
<tr>
<td>1959</td>
<td>77</td>
<td>187,576</td>
<td>2,197</td>
</tr>
<tr>
<td>1960</td>
<td>80</td>
<td>189,816</td>
<td>2,259</td>
</tr>
<tr>
<td>1961</td>
<td>81</td>
<td>192,947</td>
<td>2,314</td>
</tr>
<tr>
<td>1962</td>
<td>83</td>
<td>186,468</td>
<td>2,258</td>
</tr>
<tr>
<td>1963*</td>
<td>82</td>
<td>176,683</td>
<td>2,153</td>
</tr>
</tbody>
</table>

*Preliminary data.
Source: (52) and (51).

Marketing Agreement Act of 1937. A program of milk licenses was first authorized under the Agricultural Adjustment Act of 1933 (amended in 1935). Because of the Constitutional questions involved, a system of marketing orders was authorized in the Act of 1935. The 1937 Act was a reenactment of most of the 1935 provisions.

The 1937 Act authorizes federal marketing orders and agreements for other agricultural products but, concerning milk, there are several declared purposes. Section 602 (1) confers upon the Secretary of Agriculture the authority: "... to establish and maintain such orderly marketing conditions for agricultural commodities in interstate commerce as will establish, as to the prices to farmers, parity prices ..." This section confers price support authority on the Secretary but apparently conflicts with other sections as will be shown later.

It is also a policy of Congress as stated by the Act: "To protect the interest of the consumer ..."

Section 602, subsection 4, confers on the Secretary the power to: “... establish and maintain such orderly marketing conditions for any agricultural commodity enumerated in Section 608c (2) of this title as will provide, in the interests of producers and consumers, an orderly flow of the supply thereof to the market throughout its normal marketing season to avoid unreasonable fluctuation in supplies and prices.”8

Supposedly, regulation of milk under this Act has been in the direction of effecting this policy. Price supports for milk have been handled under other programs. One reason for this situation may be a later limitation in the Act: “No marketing agreement or order applicable to milk and its products in any marketing area shall prohibit or in any manner limit, in the case of the products of milk, the marketing in that area of any milk or product thereof produced in any production area in the United States.”9

This section could conflict with the stated policy of establishing parity prices. If a price established within an order exceeds the price of milk in other areas plus transportation costs, other milk flows into the market in the absence of restrictions. But this section states that the regulation will in no way limit the entry of that milk. This section has been given added effect by a recent Supreme Court decision.10 Compensatory payments which can restrict entry of milk from outside the regulated market were declared unconstitutional in the Lehigh Valley Case.

Method of Regulation

Federal orders regulate milk marketing by first classifying milk according to its use. Many markets have two classes: one for fluid uses, one for manufacturing uses. Each handler accounts to a market administrator for his total milk receipts and use.

A minimum price is established for milk in each use and handlers must pay it. Class I prices are determined in one of two ways. One is a manufacturing type formula. The price is calculated by taking either a Midwest condensory price or the Minnesota-Wisconsin manufacturing milk price, whichever is applicable, and adding a differential for the extra costs involved in producing for a fluid market. An adjustment is also made for the supply-demand conditions in the market. In other markets, economic formulas are used. The price is based on certain costs of production, per capita disposable income, and changes in the general level of wholesale prices.

Class prices for milk used in manufactured products are based on product prices, less a manufacturing allowance, or on prices paid for milk by manufacturing plants in Minnesota and Wisconsin.

The order provides a method for determining which handlers are included in the regulation. An attempt is made to define the market as the...

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87 U.S.C. 608.
area where the same dealers compete for sales. The order allows price adjustments to be made for distance from the market, butterfat differences, and seasonal price differentials.

A "uniform price" is determined for producers serving the market in one of two ways, depending on whether the market is an "individual handler pool" or a "marketwide pool." The price to producers in individual handler pool markets reflects utilization of the handler to whom the producer delivers his milk. Since utilization of milk usually differs among handlers, the price to producers serving the market differs. In a marketwide pool, the uniform price reflects utilization for the market as a whole. So the uniform price is the same to all producers in the market.

The following is a simple illustration of price determination under a marketwide pool. Class I and Class II prices paid by handlers were determined by formula to be $5 and $3 per cwt., respectively. The following quantities are produced and marketed:

- Total producer milk: 100,000 pounds
- Class I milk: 50,000 pounds
- Class II milk: 50,000 pounds

The uniform blend price which must be paid by handlers to producers in this market is:

\[
\frac{($5 \times 500) + ($3 \times 500)}{1,000} = $4 \text{ per cwt.}
\]

Handlers in the market with a higher utilization than for the entire market pay into a producer settlement fund. These payments are the source of withdrawals used by handlers with low utilization so they can pay the uniform blend price.

In addition to fixing prices to be paid for milk, the Act authorizes the Secretary to issue orders "Incidental to the terms and conditions . . . of establishing minimum prices for milk . . . and necessary to effectuate the other provisions of the order." Some of these other orders are: performance requirements, down-allocation of unregulated milk, and compensatory payments. Performance regulations require a handler to sell a specified proportion of his milk into the Class I market in order to participate in the producer settlement fund. This requirement ensures that the handler does not merely ride the pool (producer settlement fund).

A pool rider makes an occasional sale of Class I milk just to be able to withdraw money from the producer settlement fund and pay his producers the market blend price. A pool rider with primarily a manufacturing operation can have a large advantage over nonregulated manufacturing plants in the purchase of milk from producers.

Down-allocation provisions provide that other source milk (milk not subject to the pricing provision of the order) must first be assigned to

lower value uses. In determining the uniform blend price for the market, this other source milk is substracted, beginning with the lowest value use, from the quantity of milk in each class. So the handler who buys other source milk must allocate regulated producer milk to high value uses. The handler cannot buy other source milk which will reduce his utilization and decrease his obligation to the pool.

Compensatory payments are often used with down-allocation. Down-allocation is used to discourage importation of outside milk which might endanger the classified price system. But, if a handler has high Class I utilization or all of his utilization in high value classes, he could buy non-regulated milk at a low price. The handler would be obligated to the pool for the Class I price only on producer milk. To preclude this situation, orders require the handler to make compensatory payments to the pool on unregulated milk. This payment has been calculated as the difference between the Class I price and the blend price or the Class II price. In effect, this provision assures the handler that the use of unregulated milk for bottling will cost him at least as much as regulated supplies.

A 1961 Supreme Court decision invalidated the compensatory payment provision of the New York-New Jersey Marketing Order. The former provision set the pool payment on other source milk which had been classified Class I as the difference between the Class I and the Class III price (manufacturing class). The current provision reduces this pool obligation to the difference between the Class I and the uniform blend price.

Minneapolis's Interest in the Federal Order Program

Several provisions and effects of federal orders have been criticized. Minneapolis's past interest apparently was motivated primarily by the desire to move fluid milk into other markets. Such features as down-allocation and compensatory payments have been contested when Class I prices in federal order markets exceed fluid milk prices in Minnesota plus the cost of transporting milk to those markets. However, for the foreseeable future, Minnesota will be primarily a manufacturing milk-producing state. Therefore, federal orders are more important to Minnesota as a producer of manufactured dairy products than as a producer of fluid milk. Adverse effects on manufacturing milk product markets can develop from both Class I and Class II pricing.

High Class I pricing or price increases cause several developments which damage Minnesota markets for manufacturing dairy products. High Class I prices are reflected in high consumer prices. As prices of Class I products increase, smaller quantities of them are taken. So a larger proportion of the milk in the market is used for Class II (manufactured) products which compete with products from traditional manufactured dairy product areas.

Table 12. Class I utilization as a percent of all milk received from producers in federal order milk markets, United States, selected years

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Boston</td>
<td>64.4</td>
<td>54.1</td>
<td>55.3</td>
<td>58</td>
<td>54</td>
</tr>
<tr>
<td>New York</td>
<td>61.5</td>
<td>51.6</td>
<td>47.0</td>
<td>52</td>
<td>49</td>
</tr>
<tr>
<td>Philadelphia</td>
<td>82.8</td>
<td>76.0</td>
<td>74.1</td>
<td>72</td>
<td>*</td>
</tr>
<tr>
<td>Cleveland</td>
<td>80.9</td>
<td>71.9</td>
<td>69.0</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Chicago</td>
<td>55.8</td>
<td>50.1</td>
<td>51.6</td>
<td>45</td>
<td>39</td>
</tr>
<tr>
<td>Minneapolis-St. Paul</td>
<td>59.8</td>
<td>59.0</td>
<td>74.5</td>
<td>67</td>
<td>62</td>
</tr>
<tr>
<td>Duluth-Superior</td>
<td>65.0</td>
<td>54.1</td>
<td>44.2</td>
<td>53</td>
<td>57</td>
</tr>
<tr>
<td>St. Louis</td>
<td>84.7</td>
<td>80.6</td>
<td>81.7</td>
<td>75</td>
<td>73</td>
</tr>
<tr>
<td>Louisville</td>
<td>76.1</td>
<td>68.9</td>
<td>73.0</td>
<td>74</td>
<td>*</td>
</tr>
<tr>
<td>New Orleans</td>
<td>88.9</td>
<td>76.8</td>
<td>70.3</td>
<td>70</td>
<td>68</td>
</tr>
</tbody>
</table>

* Federal order no longer in effect or consolidated with another order.
Source: (52).

The longrun effect of increasing Class I prices is increased milk supplies in response to the higher blend price. Additional producers enter the market; old producers expand their production. Compensatory payments and down-allocation may limit some other source milk from entering the market but total quantity increases. This increase goes into manufactured dairy products. This increase in the proportion of Class II milk causes the blend price to fall.

The fall in the blend price to producers may cause them to petition for higher Class I prices. If successful, the same chain of events occurs again. So there may be constant pressure to increase prices.

As milk prices increase, they may be capitalized into land and property values. If this happens, they are included as costs. In markets where costs are a bases of pricing, they increase prices still further.

Federal order regulations of milk may have increased supplies in those marketing areas to the detriment of manufacturing milk areas (see Table 12). Table 12 lists Class I utilization as a percentage of all milk received from producers in selected federal order milk markets. In all except one of the markets listed, Class I utilization decreased. This decrease occurred in spite of the purported objectives and guides of the program to assure an adequate supply and to protect consumer interests.

Supply response per dairy farm in selected states also raises questions about federal order pricing (see Table 13). Figures in Table 13 show the percentage which 1954 and 1959 sales were of 1950 sales. New York, Pennsylvania, and Massachusetts have a very large share of their production utilized for fluid needs and a large share of their milk priced under federal orders. Wisconsin, Minnesota, and Iowa are important states in the production of manufactured dairy products. From 1950 to 1954, the three eastern states had a greater increase in production per farm than any Midwest dairy state. For the entire period Minnesota had a greater...
increase in marketings per farm than New York, but increases in Massachusetts and Pennsylvania exceeded Minnesota’s increase. Increases for all three eastern states exceeded increases in either Iowa or Wisconsin for the entire period.

The figures are far from conclusive as to the effect of federal order pricing in stimulating milk production. Nevertheless, they raise a question as to how this pricing affects supply responses in order markets. To the extent that order prices may be higher than necessary to assure adequate quantities of milk for fluid uses, manufactured products from the Midwest may be displaced.

High Class I pricing is not the only concern of Minnesota’s dairy interests. Pricing of Class II or manufacturing grade milk under federal orders can greatly affect the industry. However, underpricing of this milk is the problem. This practice brings about several developments. It allows independent processing firms to obtain milk at a price much lower than competitive nonorder manufacturing plants. This fact might cause them to pay premiums for milk in manufacturing uses. Likewise, a cooperative may use the advantage in increasing producer returns to expand cooperative membership. So pressure may develop to expand manufacturing milk operations. Fluid distributors may find difficulties in obtaining adequate supplies of milk. In this case, pressure may develop to increase the Class I price in order to secure adequate supplies. Higher Class I prices mean higher fluid prices and decreased consumption of fluid products.

Competitive inequity arises because of underpricing Class II milk. Federal order milk producers, who supposedly cannot produce milk at manufacturing milk prices, have a large share of their milk used in manufactured dairy products. If the order milk is underpriced, manufactured products from these markets enjoy a price advantage over products from manufacturing milk areas. Therefore, these products can easily displace products from manufacturing milk areas. Important questions are to what extent Minnesota’s interests are disadvantaged and how much underpricing in federal orders can be justified.
Underpricing manufacturing milk in federal order markets has the same effect as “dumping” in international trade. It takes markets away from parties who must sell at or above their production costs, even though their costs may be below those of the underpriced commodity.

The primary justification for underpricing Class II milk is that an operating reserve of milk is needed in fluid markets to take care of daily and weekly variations in demand and seasonal variations in supply. Because these handlers primarily serve the fluid market, they incur higher costs in processing Class II products than do plants in manufacturing milk areas. These higher costs arise because of the impact of seasonality of supplies on manufacturing operations in fluid markets. Some of these manufacturing operations may be operated only part of the year.

Nevertheless, this justification may not be completely valid. If this allowance is made because of the cost of serving the fluid market, perhaps this added cost should be allocated to fluid operations. The cost to handlers for milk for manufacturing uses should be the price in non-regulated manufacturing areas.

That manufacturing class milk in federal order markets may be underpriced is illustrated by data in table 14. Manufacturing grade milk prices in Minnesota used for butter and creamery byproducts are compared with the price of manufacturing class milk of equivalent test in federal order markets. Manufacturing milk in federal order markets was priced below Minnesota manufacturing milk more than 60 percent of the time for the months indicated. Often, the price was more than 20 cents per cwt. below the Minnesota pay price.

The extent of underpricing would be greater if some other manufacturing milk price series was used. The Wisconsin pay price for milk used in butter and creamery byproducts was 12-19 cents per cwt. higher than the Minnesota price for these same months. Average prices paid in both the East North-Central Region and the West North-Central Region were considerably above the Minnesota price for the same months.

| Table 14. Relationship of manufacturing class milk prices in federal order markets to Minnesota manufacturing grade milk, January and July 1962 and 1963 * |
|---------------------------------|-------|-------|-------|-------|
|                                 | January | July | January | July |
| Total number of federal order markets | 79     | 82    | 82      | 82    |
| Number of markets with prices below Minnesota pay price | 76     | 76    | 51      | 61    |
| Number of markets with prices 10 cents or more per cwt. below Minnesota pay price | 59     | 54    | 25      | 35    |
| Number of markets with prices 20 cents or more per cwt. below Minnesota pay price | 27     | 25    | 12      | 22    |

* Prices in federal order markets were calculated for milk with milkfat test of Minnesota manufacturing grade milk.
Source: Calculated from prices in (12) and (53).
Perhaps underpricing of manufacturing milk in some areas can be justified. But many markets where such underpricing apparently exists are in major milk-producing states. The cost of milk production in these states exceeds cost in the Upper Midwest. Federal control should not be used to allow them price advantages over nonregulated areas.

Criteria for Price Alignment

Price levels in federal orders are governed by certain criteria for alignment among markets. One automatic provision, "the supply-demand adjuster," sets up a level of "standard utilization" expressed as the percent of producer milk used for Class I purposes in the market. If Class I utilization exceeds this standard, the Class I price is increased. If Class I utilization falls below the standard, the Class I price is decreased.

Another guide was stated by the USDA Milk Marketing Orders Division (51, p. 27):

The level of Class I price in any market generally cannot exceed for any length of time the cost of buying in another supply area and transporting it to the consuming market. If a price advantage exists long enough for handlers to recognize the advantages of another supply, they will change their buying arrangements.

However, these guides are limited, especially in the long run. If uniform prices are greatly decreased, pressure develops to call an order hearing for raising the Class I price. In many markets, Class I prices do not always decrease although Class I utilization does. Therefore, supply-demand adjusters are limited as a method of maintaining price alignment over time.

The effect of alternative supply costs (price plus transportation charges) on maintaining price alignment is limited. Compensatory payments and down-allocation may prevent alternative supplies from entering the market and lowering the price.

A USDA study found that federal orders increase alignment of prices between distant fluid milk markets and major supply areas. Price differences between major and minor markets were found to approximate the cost of transportation between markets (5). Prices in state regulated markets were found to be generally higher than prices in federally regulated markets.

Many people believe that as long as federal order prices do not exceed this level—the cost of transporting milk between markets—prices are aligned. But this may not be a valid criterion. For example, suppose two milk consumption areas of the same size, whose supply areas do not overlap, have the same costs of production. One area produces milk to cover fluid needs only; the other produces twice as much as it uses as fluid milk. Should the fluid price in the minor producing area exceed the fluid price in the major producing area by the cost of transporting milk between the two areas? No reason is apparent why the fluid prices should not be the same.
Now, if production costs in the minor producing area increase, Class I prices also increase. But only if the difference in costs equals the transportation cost should the price difference between the two areas be at that level. If costs exceed transportation costs, then milk should move from the major producing area.

Of course, the example is simplified; it assumes away the problem of comparative advantage. But there are questions concerning price alignment among federal order markets and federal order and nonorder markets.

Pricing milk on the basis of production costs from alternative supply areas should be a consideration. Such pricing might be more equitable between order and nonorder markets. Of course, adequate supplies should also be a consideration. But too often the adequate supply guide is used to suggest that all fluid needs must come from the immediate supply area. With present methods of hauling milk long distances and safeguards to assure quality, fluid milk does not have to be supplied by immediately adjacent production areas.

The Minnesota dairy industry would benefit if an integrated system of federal order fluid milk markets was developed. Free movement of milk among all areas could take place; each market would not require a large surplus to meet temporary shifts in demand. Price adjustment would be made for all areas when supplies and needs get out of line. If transportation improved to the extent that costs were reduced, perhaps Minnesota could even increase sales to distant fluid markets.

Super-pool Payments

Another innovation arose in milk pricing in recent years—the super-pool payment. It is a charge negotiated by the cooperatives on all milk for fluid use sold to market distributors. In other words, prices reported by administrators of federal orders may be lower than prices paid by distributors. So, reported data may be of limited usefulness in analyzing price-quantity relationships. In 1962, over one-third of all federal order markets had above order prices (48).

But what about the equitable relationships between milk-producing areas? Are super-pool payments supported by provisions of the federal order? Down-allocations and compensatory payments can prevent outside milk from entering the market and, therefore, protect high prices established by super-pool payments. To the extent that super-pool payments, supported by the order, raise prices above the level necessary for adequate milk supplies, the Minnesota dairy industry is damaged.

These super-pool payments or negotiated premiums are large in some markets. Michigan Milk Producers Association negotiated premiums on Class I milk in Michigan markets ranging from 2.5 cents to 52 cents in order areas in October 1964 (32). These super-pool payments increased the pay price to producers from 2 to 35 cents per cwt.

The Puget Sound order in Washington has a super-pool payment. In
1952, Class I utilization in that market was 73.9 percent; by 1963, it had dropped to 45 percent. A question is raised here as to the importance of the super-pool payment in stimulating excess milk production.

The Chicago order has a super-pool requirement that maintains the Class I price at a fixed level no matter what the order price. (For a considerable period of time the Chicago super-pool payment maintained the Class I price at $4.29 per cwt.) This provision makes the supply-demand adjustment provision of the order useless.

If super-pool payments are supported by the order, then remedial action should be taken. Effects of these payments are the same as increases in the Class I price; manufacturing milk areas can be damaged in the same way. Remedies for this situation probably must come through the USDA Dairy Branch.

**State Milk Control**

Marketing of Minnesota’s dairy products is influenced by milk control laws of other states. These laws may be more restrictive than federal control.

The first milk control laws were enacted in 1933. Between 1933 and 1936, 21 states enacted milk control laws (42). In 1962, 19 states had milk control laws regulating producer prices (47). Many states tried milk control programs but repealed them.

State milk laws regulate more activities than do federal regulations. They establish producer prices; several establish retail and wholesale prices. Some states control entry of producers and distributors. They establish differentials for container sizes, container types, and delivery methods. Many states regulate trade practices such as rebates, advertising allowances, free service and merchandise, and misrepresentation. The provisions most likely to influence markets for Minnesota dairy products are minimum producer pricing and regulation of entry of producers and distributors.

**Objectives and Methods**

Objectives of milk control laws are generally similar to those proposed for federal milk marketing orders: to ensure an adequate supply of healthful milk, to provide for orderly marketing, and to stabilize returns to dairy farmers.

Conditions that prompted enactment of state milk control were also generally the same as conditions that brought about federal regulation. Low consumer purchasing power was causing declining milk consumption. Improved methods in transporting fluid milk over long distances helped break down classified pricing systems established by cooperatives. Both these developments resulted in low milk prices to producers. Many states sought to solve the problem with establishment of minimum prices to producers. Some established resale pricing.
The success of states in maintaining producer prices has been limited. Attempts to raise producer prices above the level at which alternative supplies could be obtained have been restricted by court decisions. In an important decision, Baldwin vs. G.A.S. Seelig, 249 U.S. 522 (1935), the Supreme Court ruled that a state could not regulate prices paid to producers in other states and sold within the state. So price objectives of milk control commissions are often frustrated by entry of outside milk purchased at a lower price.

For example, Class I milk prices established in western Pennsylvania by state milk control are reported among the highest in the nation. Yet, the blend price is lower than in many adjacent areas because of the lack of authority to restrict entry of outside milk. Handlers purchase milk across the state line at a lower price and use it for Class I purposes; some milk is Pennsylvania milk that was hauled across the line to avoid pricing under state milk control and then hauled back (37).

Minimum pricing can, under certain conditions, raise producer prices. Markets in central parts of some states may partially isolate themselves from alternative supplies on the state’s borders. States isolated geographically from alternative supply areas, and with milk production usually equivalent to fluid needs, may successfully regulate minimum prices. California, Alabama, and Mississippi, for example, are states where price control is not very vulnerable to alternative supplies.

Additional factors bearing on the effectiveness of minimum pricing by the state are the nature of health regulations and the existence of federal order markets. The state cannot enforce minimum price provisions on out-of-state milk. But the state health department may refuse milk because it does not meet health requirements—and this does happen (54). Resale milk prices are established in 10 states. They may be designed to protect distributors and producers from low-priced out-of-state milk. They prevent price wars that can weaken the industry. And they protect producers by ensuring that distributors can pay the minimum price to producers (54).

Store and home delivery price differentials are a controversial area of retail price setting. People interested in maintaining home delivery argue that it increases milk consumption which is beneficial for good health and for milk producers. Therefore, there should be no margin between the store and home delivery price or it should be very low in order to maintain high consumption levels. But those interested in store sales argue that lower costs are associated with this distribution method so consumers should benefit from the savings.

The problem of price differentials for containers also exists where resale milk prices are set. Some states set the per quart price on the gallon jug at the same level as the single quart price. Undoubtedly, there are cost savings with some large containers. Not allowing a price differential prevents consumers from sharing in the savings and retards adoption of the innovation.

Some states control the entry of producers and distributors into state-
controlled markets. For instance, New York’s milk control law requires all milk distributors to be licensed. The Commissioner of Agriculture grants or renews these licenses. A dealer’s license may be revoked for acts “... injurious to ... the public welfare, or to trade or commerce in demoralization of the price structure ...” so as to interfere with an adequate supply of milk. Also, the Commissioner can refuse to grant a license if evidence shows “that the issuance of the license will tend to destructive competition in a market already adequately served” (7).

The power to revoke a license has not been used, but the power to extend existing licenses and grant new licenses has been used. These restrictions are based on the grounds that granting a license contributes to the destruction of competition (7). Refusal to extend distribution areas affects the technological development of the industry. Improved roads, refrigeration equipment, and the paper carton all tend to expand the optimum size of distribution areas. These controls reduce the incentive to adopt new technology and prevent consumers from sharing in the benefits of technology.

Several state milk laws allow the milk control commission to limit access of producers to milk markets. The Florida law, recently declared unconstitutional, illustrates regulation of producers that serve a market. This state law required the Florida distributor to buy all Class I milk from Florida producers and pay the Class I price. The Florida distributor had to purchase all the milk offered by Florida producers. But if Class I needs were not met by Florida producers, then distributors could purchase outside milk. But if the distributor acquired milk in excess of Class I needs, the lower returns from the excess milk were paid to the out-of-state producers. In effect, outside producers could not share in the Florida market because usually they could be paid only at the low class prices.

The Supreme Court held that this law preempted the Florida market for Florida producers. The exclusion of outside producers by this method violates the commerce clause of the Constitution.

Payment provisions of state milk control are just one method which states use to isolate themselves from out-of-state milk supplies. In several cases, these attempts were declared illegal.

**Importance of State Milk Control Provisions to Minnesota**

Provisions discussed in the last section do not include all facets of milk marketing controlled by states. However, they are the provisions most likely to affect the Minnesota dairy industry.

Establishment of minimum producer prices with the objective of orderly marketing alone is not a detriment to the Minnesota dairy industry. When an artificially high milk price is established and maintained by restrictions on entry of producers and distributors, then inequities arise. Minnesota dairy firms cannot take advantage of the high prices be-

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cause of entry restrictions.

In many instances, the price may not be high enough for Minnesota to supply fluid milk even though it is above competitive levels. However, the indirect effect of high producer pricing may be very important for Minnesota's industry. The result, like that of high milk pricing in federal order markets, may cause increases in milk production in these areas. If fluid needs are adequately met, the additional milk is processed into manufactured dairy products which displace products from this area.

The following data suggest that state milk control may raise milk prices above the level established in the absence of such controls. In 1962, 19 states set producer prices. The average wholesale price received for milk in these states in 1962 was in all cases higher than the U.S. average wholesale price. In 1961, the average price in 18 of these states was above the U.S. average price. Admittedly, these figures are gross measures, but they may be starting points for research on effects of state pricing of milk.

Resale price fixing is authorized in 10 states. Few data are available on these set prices. However, high and increasing resale prices restrict fluid product consumption and channel more milk into manufactured products.

Establishment of store-route differentials and container differentials is more likely to affect the distribution industries in those states than the markets for Minnesota dairy products. Maintaining higher prices for milk in paper cartons than in glass bottles can prevent outside distributors from selling in some states. Maintenance of store prices at route levels may discourage store sales. Where outside distributors could serve store accounts at a lower cost because of fewer stops and larger deliveries, these regulations restrict movement of milk products. However, such regulations are not likely to involve large quantities of milk. And, they are likely to have more impact on other states than on Minnesota.

Potential for Minnesota's Dairy Industry

State milk control has been proposed to deal with problems of the Minnesota dairy industry but no comprehensive law has yet been enacted.

Objectives of the proposed Minnesota legislation are similar to the objectives of existing legislation in other states: raising the level of producer prices, promoting orderly marketing of milk, and preventing destructive competition.

But state milk control is likely to be of limited usefulness in raising producer milk prices in Minnesota. Price increases are usually for fluid milk only; raising the price of milk for manufactured dairy products would price Minnesota out of these markets. Raising the price of fluid milk above competitive levels in an intensive dairy production area might also be disastrous. Milk from Wisconsin could not be regulated because
it is in interstate commerce. Therefore, for the Twin Cities market, unpriced Wisconsin milk probably would come in at a price advantage. Similarly, most other Minnesota markets could be supplied with fluid milk from out-of-state sources.

If state milk control can raise the level of producer returns in Minnesota, minimum price control and associated regulations are still difficult to justify. The Minnesota dairy industry generally contends that milk control laws of other states restrict the free movement of milk and milk products. It does not seem a good strategy to use an institutional device in Minnesota which is criticized when used in other states.

The objective of promoting orderly milk marketing is general. However, it appears to be most often directed at stabilizing supply areas for fluid markets and assuring consumers of adequate fluid milk supplies through classified pricing of milk.

State milk control probably cannot contribute significantly to marketing of milk in Minnesota. In fact, the longrun interests of Minnesota producers are probably best served by great milk mobility and few market restrictions. Federal orders already establish classified milk prices in the two major metropolitan markets. Federal orders are not limited to intrastate milk shipments as is state milk control. Therefore, in Duluth-Superior and Minneapolis-St. Paul, orderly marketing is much more effectively established than it would be with state milk control.

Many Minnesota markets—usually small markets—are not controlled by federal regulation. Maintaining orderly marketing in these small markets is not as serious a problem as it is in major metropolitan markets.

Minnesota law does regulate dairy trade practices. Authority for such regulation is in the Dairy Industry Unfair Trade Practices Act and the minimum markup sections of the Minnesota Trade Regulation Law. Primary purposes of trade regulation are to prevent destructive and predatory competitive practices and to contribute to orderly marketing.

Numerous trade practices are forbidden. Equipment, advertising, and loans cannot be provided retailers by wholesalers, distributors, or manufacturers at less cost than they would be provided by third parties. Manufacturers, wholesalers, and distributors for fluid milk and frozen dairy products must follow regulations on price posting and reporting to the Commissioner of Agriculture. A wholesaler or subjobber cannot sell to a retailer at less than a 2-percent markup above the manufacturer's price. And a retailer cannot sell at less than an 8-percent markup above the manufacturer's price.

Minnesota dairy trade practice legislation allows technology and innovation to be strong forces in the industry. Furthermore, it is not a costly program. And it lets consumers benefit from technology and innovation. Fixed prices and markups sometimes prevent such benefit.

Trade practice regulations for Minnesota's fluid milk and frozen products probably offer the greatest potential for preventing competitive abuses. They restrict trade practices—such as free equipment and free
advertising—which large firms use to destroy or injure small competitors. Of course, important enforcement difficulties arise.

The potential of state milk control to solve Minnesota's problems is subject to the following limitations:

1. State milk control is limited to fluid milk markets so a large proportion of the state's milk would not be affected by regulation.

2. Since Minnesota is in an intensive dairy-producing region, the ability of state regulation to raise significantly producer prices is limited.

3. Federal regulation already establishes orderly marketing in major fluid markets so state regulation would cause unnecessary duplication.

Sanitary Regulations

Sanitary regulations are effective and often used methods of restricting interstate and intrastate movements of milk and milk products. Constitutionally, a state cannot impose price controls on milk moving from another state but it can impose sanitary requirements. This control method has been qualified by court decisions. However, because of the numerous levels of government that can impose sanitary requirements and because of the variety of requirements, trade restrictions are an ever present problem.

Two important effects of sanitary regulations on the Minnesota dairy industry are:

1. The restriction on entry of milk and milk products. This restriction may be designed to achieve economic goals, such as higher prices to local producers.

2. The excessive duplication occurring in health regulations. Such duplication may increase marketing and production costs for milk beyond what is necessary to assure minimum quality. Insofar as these costs are reflected in milk and milk product prices, total consumption may be restricted.

Costs of excessive duplication by milk control authorities are illustrated by recent studies. A study of duplication of health authorities in the Minneapolis-St. Paul milk market estimated that total costs of the program could be reduced by $22,294 (13 percent) by consolidation of the milk control activities of the two departments. And there is already much coordination of activities between the two health agencies and duplicate inspection of plants and producers is not a problem. The extra cost arises because of operating two offices where one would be adequate. A New York study of the impact of the proposed National Milk Sanitation law found that some milk producers could be subjected to 12 or 13 health agencies simultaneously.

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14 See especially Dean Milk Co. cases: Dean Milk Co. vs. City of Madison, 340 U.S. 349 (1951); Dean Milk Co. vs. City of Aurora, 404 Ill. 331 (1949) 88 N.E. 2d 827; and Dean Milk Co. vs. City of Chicago, 385 Ill. 565 (1944) 53 N.E. 2d 612.
Alabama has state regulations plus local regulations superimposed on these (25). Out-of-state shippers of milk must obtain annual permits from the Alabama Board of Health and the County Board of Health. Semi-annual permits for out-of-state producers and handlers must be obtained from the Commissioner of Agriculture after ascertaining that minimum production standards were met. In addition, a license must be obtained from the Alabama Milk Control Board that is based on certification by state and local health departments. The importer of this milk must deal with no less than four administrative agencies.

Cities in Alabama also have milk codes for milk and milk products. For example, a plant within an 8-mile radius of the Tuscaloosa city hall which processes an average daily volume of 1,200 gallons and over must pay a fee of $35. Plants with smaller volumes pay as little as $15. Plants beyond the 8-mile radius must pay $100 per plant, plus a $6 inspection fee for each dairy farm from which it receives milk, plus $2 per hour for the inspector’s time, plus 7 cents per mile travelled by inspectors.

Although major court decisions have broken down many sanitary barriers, they continually present problems.

Methods of Restricting Trade

Sanitary regulations can be used to restrict trade in milk and milk products in several ways. Some regulations impose specific controls on production or processing of milk. For example, an authority may accept only chemical sterilization of equipment. Another may require only steam cleaning. So, milk products cannot move between the two areas. Some states or local units of government require specific dimensions for barns, milkhouses, equipment, etc. The greater the detail of regulations, the greater is the likelihood of conflicts and duplications. Duplications result in high costs.

Some restrictions take the form of absolute limits on areas which can supply milk to a given market. Madison, Wisconsin, was a classic example. The ordinance restricted milk distribution from any pasteurizing plant located more than 5 miles from Capitol Square in the city. Milk from producers located more than 25 miles from the same location was not accepted. This regulation was declared invalid in Dean Milk Company vs. City of Madison, 340 U.S. 349 (1951).

Refusal to accept inspection of another health agency coupled with a high charge for making the inspection may prevent milk sales. This inspection charge may be discriminatory with local producers or handlers meeting only a low proportion of inspection costs. However, it is difficult to determine equitable treatment. Should distant producers be required to pay the full amount of inspection costs or should each producer be required to pay an equal share?

Discriminatory charges for permits to ship milk into or distribute milk in a market can prevent entry of outside milk. Some health authorities charge a higher price for a permit for distant handlers than for
local handlers, although they accept the inspection of another health agency. No additional cost of inspection is incurred so this expense can give cost advantages to local producers and distributors.

Excessive detail that increases cost and has little relation to minimum sanitary requirement is also a barrier to movements of milk.

Some states have gone a long way in developing sanitary requirements which place no more than absolutely necessary burdens on interstate commerce in milk (25). Hawaii has regulations based on the U.S. Public Health (USPHS) Model Ordinance and Code. No local governments have jurisdiction. Alaska accepts fluid milk that has been certified grade A under the USPHS code. Most municipalities in Missouri accept milk certified under the USPHS code.

The National Milk Sanitation Program

The USPHS Model Ordinance and Code currently allows states to voluntarily eliminate restriction on movements of milk and milk products in interstate commerce. It provides a model to bring about uniformity in requirements, although it does not require uniformity. To participate, the state adopts the recommended code or develops one acceptable to USPHS. Supervision and inspection remain with the state or the municipality. All milk and milk products must be graded at least every 6 months. Similarly, all participating dairy farms and dairy plants must be inspected at least every 6 months. Milk plants meeting code standards are listed in "Sanitation Compliance Ratings of Interstate Milk Shippers," published by USPHS. These ratings can be used by milk shortage areas to obtain milk produced in accordance with minimum health standards.

To further reduce sanitary restrictions on fluid milk in interstate commerce, a bill known as the National Milk Sanitation Amendment to the Public Health Service Act was introduced into Congress in 1959 (25). The bill provides that no milk coming from a certified interstate plant into another state would be excluded from the receiving state if it met standards of the bill on arrival. States would control sanitation regulations and inspections. To certify plants for interstate shipment, each state would submit a plan for inspection and rating of its plants. If accepted, plants could be certified as interstate milk shippers, as under the current voluntary program.

<table>
<thead>
<tr>
<th>Truck capacity (pounds)</th>
<th>Cost per cwt. of milk per 1,000 miles</th>
</tr>
</thead>
<tbody>
<tr>
<td>13,000 - 13,500</td>
<td>$2.50</td>
</tr>
<tr>
<td>18,800 - 21,000</td>
<td>1.90</td>
</tr>
<tr>
<td>35,400 - 38,700</td>
<td>1.30</td>
</tr>
<tr>
<td>41,300 - 43,000</td>
<td>1.20</td>
</tr>
</tbody>
</table>

Source: Based on cost estimates in (46).
Both the voluntary USPHS Model Ordinance and Code and the proposed Act have the advantage of leaving intact state and local milk sanitation departments. At the same time, they facilitate coordination of departments for freer movement of milk.

More knowledge is needed about specific sanitary regulations that affect movement of Minnesota products, both fluid and manufactured. Such regulations may be crucial in determining markets for dairy products. This knowledge would assist in framing appropriate remedies.

**Transportation Rate Structures And Regulations**

The impact of transportation rate structures and regulations on movements of dairy products is a comparatively unexplored field. Its importance in determining supply areas for fluid milk is a basis for using transportation costs as a measure of price alignment between federal order markets. Its importance in determining supply areas for manufactured dairy products is much less apparent but undoubtedly a factor.

Because transportation rates and regulations greatly affect the location of supply areas, they have been manipulated or discriminatively administered to serve regional or local interests. Three features of transportation regulations are important to milk product movements:

1. Where rate setting authority is granted to a public agency, as over railroads, intrastate rates may be set lower than interstate rates.

2. States may make excessive or discriminatory charges on trucks from out-of-state.

3. Weight and size restrictions on trucks may make long distance shipment of milk impractical.

Weight and size restriction can greatly affect whether fluid milk can be transported from the Midwest to large metropolitan markets. Cost per cwt. of milk varies considerably with size of truck. Data in table 15 show costs for various size units. The two largest classes have a difference of 10 cents per cwt. for transporting milk 1,000 miles. In 1954, eight states had gross weight restrictions of 50,000 pounds or less (54). If these regulations are still in effect, the most optimum size units cannot be used to transport fluid milk to or through these states. This fact may mean a cost increase of 10 cents or more per cwt.

Ton mile taxes and registration fees may restrict milk sales in distant markets. If registration is required, emergency sales of milk may be prohibited because of the cost on small volumes. Many states now have reciprocity agreements which allow movement of trucks without charge. However, when a truck has to pass through several states, it is likely to encounter some registration fee, special gasoline tax, ton mile tax, or restriction on size.

Regulatory agencies controlling transportation rates within a state can give discriminatory advantages to local products and firms. A western
regional dairy marketing study reported rate differences for intrastate and interstate fluid milk shipments in 1953 in several western states (20). Interstate rail rates for fluid milk were 18 percent more than intrastate rates. One California railroad set interstate rates at 108.5 percent of intrastate rates. In Nevada the rate for moving fluid milk 250 miles from out-of-state was 23 cents greater than intrastate shipments for the same distance over the same line.

Research concerning effects of transportation rates on manufactured dairy products is badly needed. These are high value to weight products and are less perishable than fluid milk. But rate setting may still affect marketing, especially since these processed commodities are not exempt from Interstate Commerce Commission (ICC) regulation.

**Implications For Research And Action**

Previous sections indicated how government regulation of the dairy industry can limit Minnesota markets. Minnesota dairymen are not interested in eliminating classified pricing systems of either federal or state governments. Nevertheless, classified pricing as practiced under these orders is possible because of the existence of essentially national markets for manufactured dairy products. Since Minnesota is primarily a manufacturing milk-producing area, its primary interest is in seeing that these regulations do not adversely affect those markets.

The regulations described in the foregoing sections may have the same ultimate effect. High fluid prices supported by provision of these regulations encourage buildup of local supplies. When supplies are diverted into manufactured products, they compete with the only market available to many Minnesota producers.

Furthermore, discriminatory provisions regarding fluid milk should also be eliminated where possible. Transportation cost is a sufficient economic barrier to exclude Minnesota fluid milk from many markets. In others, Minnesota fluid milk is excluded because of restrictive features in federal and state price regulations and sanitary and transportation regulations. Minnesota producers should not be prevented from sharing on an equitable basis in fluid milk markets.

The needs in regard to regulatory programs are economic research and action programs. Research is needed to determine the actual effect of administered pricing procedures. The extent of sanitary requirements and transportation as barriers also needs study—few efforts at quantitative measurements have been made.

Research results would be useful for deciding how to eliminate restrictions and carry out the program. If administered pricing is found to greatly influence Minnesota’s dairy markets, then the state would be more effectively represented in hearings for the purpose of protecting its interests. In the case of federal orders, Minnesota producers could petition for hearings on the grounds that they are an affected party.
Methods Of Expanding Demand And Increasing Marketing Efficiency

Previous sections of this report dealt with problems of dairy product consumption and restrictions on movements of Minnesota's dairy products in interstate trade. Economic research for solutions to these problems was suggested. This section reviews and evaluates proposals for expanding markets for milk products and for improving the effectiveness of Minnesota's milk marketing industry.

Promotional Programs

Increased promotion is often proposed to improve the dairy industry's position by expanding demand for dairy products. Soft drink manufacturers are singled out as an example of advertising success. This industry, which spent 10 percent of total retail value on advertising in 1962, experienced a per capita increase in consumption from 158 bottles in 1950 to 200 bottles in 1962. Total production increased 50 percent (34). The dairy industry spent only about 1.4 percent of total retail value on advertising in 1959.

Two kinds of promotion should be distinguished—the industry versus the firm type of promotion. The industry invests in promotion activity to expand total demand for a product or group of products. The firm may also do this in its promotion program, but often it aims primarily at taking a larger share of the market in which it operates. For example, one distributor may double its fluid milk sales in a given market. But this entire increase may be the decreases in sales experienced by other dairies. Much promotion in our economy is aimed at changing market shares. Such promotional activity cannot solve the problems of the Minnesota dairy industry. It may merely increase them by increasing marketing costs.

The ability of promotion to expand demand for food products is limited. The quantity of food consumed on a per capita basis is relatively stable. Kinds and proportions of food in this fixed basket are influenced by prices, incomes, tastes, and preferences. The purpose of food promotion is primarily to alter tastes and preferences so that more of the promoted product will be consumed. Perhaps the total amount of food consumed may slightly increase. But, more likely, if the consumption of one food increases, other foods lose sales. If a food industry loses noticeable sales, it may respond by reducing prices, increasing promotion, or both.

There is another possible limitation on the ability to expand demand for a food product by promotion. Perhaps more potential exists for expanding the demand of an occasionally consumed product than for one
that is part of the everyday diet. The apparent success with promotional programs for soft drinks tends to support this hypothesis. If true, promotional efforts in the dairy industry should emphasize products which are not standard items in the daily family menu.

Apparently, promotion offers some potential for expanding demand for dairy products. For example, sour cream was promoted in the Minneapolis-St. Paul market area in fall 1959. Sales in this market for sour cream for the year following the promotion doubled over the year previous to the promotion (3). A similar promotional program for sour cream in Des Moines, Iowa, also indicated the potential for its promotion (27).

The Wisconsin State Department of Agriculture, commercial companies, and other agencies have apparently affected the total demand for cheese through promotion. At least, the demand for cheese has increased. Per capita consumption of cheese was 6.7 pounds in 1945 and 9.2 pounds in 1963 (49).

Producers of frozen orange concentrate undertook a special promotion program in 1959 (44). Results were an 11.6-percent increase in number of families purchasing frozen orange juice during the promotion period. But did the increase in sales arise by replacing fresh orange juice, fresh oranges, or other citrus fruits and juices? If so, then industry promotion may not be a reasonable policy for this segment of the citrus industry. A similar situation exists for dairy products.

Promotion of new or modified dairy products is important — consumers must become aware of these products. Where the product is not subject to restrictions on sale or manufacture (trademarks and patents), industrywide promotion could be more effective than individual firm efforts in expanding total demand for milk. Promotion of new products is part of the whole problem of product development.

More knowledge about product promotion and its effects is needed. Researchers and businessmen must know the most effective advertising methods. They also need to know about consumers and consumer motivation for effective promotion. According to Perry:

We need to know more about who the buyers and users of milk products are, what they buy and use, and the motives and reasons for their purchases. We need to know more about patronage habits for dairy products — when, how and where consumers buy. We need this on a continuing basis in order to be able to spot trends and significant changes in consumers and their preferences. It is desirable that these data be provided for state or regional areas to facilitate individual firm comparison with their own particular milk market (36, p. 41).

The previous comments indicate that promotional programs may be able to expand total demand for dairy products. Furthermore, research on promotional activities can result in cost savings by avoiding ineffective promotional methods.

Product Development

The development of new dairy products to expand markets for milk
is, no doubt, a logical way for the dairy industry to increase sales.

New food products are difficult to define. Most are not completely new but are major modifications of old products. Two-percent milk, cultured sour cream, and low fat cheese may have been considered new products. Yet the general type of product was not new. Nevertheless, the modification may result in new uses for the product.

There are many considerations in developing new dairy products. Some are unique to each product, some considerations are general to all new dairy products.

The problem of sanitary requirements has to be met for the new product. Standards at the farm for milk production and standards at the processing plant have to be determined. If the milk goes through extensive processing, standards for manufacturing grade milk are likely to be adequate. Manufactured products are not as restricted as fluid products in interstate commerce. Therefore, there should be less difficulty in meeting sanitary requirements for manufactured dairy products than fluid products in other states. If the new product is classified as a fluid product or a soft product requiring state or local health department approval, sanitary requirements may limit the effectiveness of the product in expanding sales of Minnesota milk.

Processing costs are a major factor in the development of a new dairy product. High processing costs mean a high product price and restricted consumption. If the product is a close substitute for some other food product, processing cost may determine if the product is accepted at all.

Another question important to the industry concerns whether the new product replaces another dairy product. If so, there may be no gain in the demand for milk or milkfat. For example, low fat cheeses are now being developed. They may appeal to new consumers and thereby increase total milk utilization. But, if they merely replace some cheese that is now sold, they might decrease the demand for milkfat.

Low fat milk is another example. It can be classified as a new product, yet probably will not have much impact on the total demand for milk. However, the use of nonfat solids for fortifying the product will increase and fat utilization will decrease.

The processing location of a new product also greatly affects its ability to expand markets for Minnesota dairy products. If it is a fluid product or a soft product, milk for it may be produced near consuming areas. Acceptable prepared foods can be developed that use milk as one major ingredient, but the source of supply of the other raw products may be a better location for processing than the milk-producing area. In that case, the major benefits may not accrue to the Minnesota dairy industry.

Milk concentrates provide an example of relatively new products and their potential for expanding markets, especially for expanding markets for milk from this area.

Three types of milk concentrates have been developed:

1. Sterile concentrate, an aseptically canned milk, that can be stored at room temperature for extended periods of time.
2. Refrigerated milk concentrate, marketed in paper containers, that has advantages to the consumer in weight and space saving in the refrigerator.

3. Frozen concentrate.

Progress in the marketing and acceptance of milk concentrates for fluid use has not been encouraging. At times, flavor differences between a good milk concentrate and fresh whole milk have been shown to be indistinguishable (56) (30). Yet, with the same prices for fresh whole and concentrated milk, people are reluctant to accept the new product. Even where concentrate has been available at a discount, it has not taken a major share of sales (30).

Price advantages apparently exist from transportation savings for concentrated milk from the Midwest if no restrictions on its movement in interstate commerce are imposed. A Wisconsin study estimated that a reconstituted packaged milk in New Orleans could sell for about 2 cents per quart under the New Orleans price (39).

Estimates in a USDA study were somewhat better for the Washington, D.C., market. These estimates were made for milk sold in the 3:1 concentrate form. Home delivery prices ranged from 4.75 to 6.75 cents per quart less for concentrate than for fresh whole milk. Store prices ranged from 3.3 to 5.8 cents per quart less for the concentrate (30).

With an acceptable product and a decided price advantage, why hasn't concentrated milk developed a wider market? Impediments to its movement in interstate commerce partially answer this question. Refrigerated concentrated milk is about as perishable and has many of the same handling problems as whole milk. Therefore, sanitary requirements for its production and processing are the same as requirements for fresh whole milk in fluid uses. Grade A requirements bring the concentrate under the pricing provisions of state or federally regulated markets. So price advantages that could be realized in many distant markets are eliminated by classification and compensatory payment features of federal orders. Minimum resale pricing provisions of state orders are likely to restrict the product's acceptance.

A recent study estimated that total milk sales would increase by 16.2 percent from the Lake States if a completely acceptable concentrate replaced fresh whole milk and all institutional barriers to the movement of milk were removed (57). Both the Class II price and the average grade A price in the Lake States would increase with this development.

The experience with concentrated milk illustrates problems of a new product: consumer acceptability, sanitary regulations, and economic restrictions that may retard product development. The product may offer potential for expanding sales of Minnesota milk, but many factors limit market expansion.

Milk concentrates have caused interest in expanding U.S. sales of milk products in foreign markets. Some active programs have been undertaken. The University of Wisconsin recently participated in a program.

50
to determine acceptability of sterile milk concentrates in African countries. Milk concentrates may increase markets for milk in the Caribbean area. These countries import evaporated and condensed milk and dried, skim, and whole milk powder, primarily from Commonwealth and Common Market countries. Graf concluded that sterile concentrate may have advantages not enjoyed by other U.S. dairy products (16). Generally, present import duties would not be serious restrictions—they would vary from nothing to 16.5 percent (16).

Sterile concentrates could favorably compete in price with fresh whole milk and other reconstituted milk now being sold on the islands. However, there are plans for reconstituting plants that use vegetable fat. This product would definitely affect the potential for U.S. sterile concentrates because it would probably cost less.

The “new product route” to expanding demand for milk and milk products entails certain risks that must be assumed. But these risks can be minimized, at least in the domestic market, by learning about why people consume certain foods.

**Improved Quality And Sanitary Requirements For Manufacturing Grade Milk**

Minnesota lags behind other states in raising production standards for manufacturing grade milk. It is the only major milk-producing state without a milkhouse law.

Standards for producing milk for manufacturing purposes are minimal. To be acceptable, milk must meet only specified grading requirements at the receiving plant. The lack of production standards may limit markets for Minnesota’s manufactured products. For example, non-fat dry milk solids are increasingly being used for fortifying grade A milk products. Powder used for fortification logically should be made from grade A milk or milk produced under high production standards. Minnesota producers and firms should be in a position to meet additional powder requirements for this market.

The market for nonfat powder for fortification purposes is increasing in importance. The May 1964 “Fluid Milk and Ice Cream Report” listed sales and per capita consumption of fortified skim products in all federal order markets. Some markets had no sales of fortified skim products; others had large sales. In the Cedar Rapids-Iowa City, Iowa, market in 1963, 24 percent of all fluid milk products were fortified skim products. In the Minneapolis-St. Paul market, 14 percent of all fluid product sales were fortified skim products.

The same data indicate that use of fortified products is increasing. From 1962 to 1963, 58 of 68 federal order markets in which fortified products were sold had increased sales. Fortified skim milk product sales for all these markets combined increased 14 percent for the 1-year period.

Large quantities of nonfat dry milk are used in cottage cheese production. Although no figures have been published, trade people think that a large proportion of cottage cheese is made from fortified skim milk.
Furthermore, many markets require that cottage cheese be made from grade A milk so grade A milk powder may be required for fortifying.

The market potential for fortification powder in cottage cheese is large. A rough estimate for 1963 based on per capita consumption figures indicates a market for about 30 million pounds of powder, roughly 1.5 percent of total nonfat dry milk production.

These figures have special significance for the Minnesota dairy industry. As the largest producer of nonfat dry milk powder in the nation, Minnesota has a vital interest in the market. Its product should meet high production requirements. Or Minnesota should be able to easily begin production of the grade A product. A milkhouse requirement is a major step toward grade A production.

Because increased production standards may be costly, some small milk producers may be driven out of business. However, these costs to the industry should be weighed against the cost of not increasing production standards. Perhaps improvements in milk quality will not dramatically increase demand for Minnesota milk and milk products. But as an important dairy state that is trying to improve its longrun competitive situation, Minnesota must be a leader in production of high quality milk and milk products.

Reorganization Of The Dairy Processing Industry

Approaches to improving the competitive position of Minnesota's dairy industry already described aim at expanding demand for dairy products. Increased efficiency in processing and marketing can also substantially benefit the marketing industry and milk producers. Many dairy processing plants in the state are too small to operate at or near an optimum level of cost. Furthermore, assembly routes excessively overlap. This situation could be improved by a reorganization into fewer and larger plants.

Advantages of Size in Processing

Advantages of increased size of dairy processing plants are illustrated by results of cost studies. Modified results are presented in tables 16 through 20. They show the cost decreases occurring as plant size increases. Plant size is measured by annual volume of product or milk received.

These estimates probably are conservative estimates of the possible gains. Cost reductions, except for ice cream, are based on studies for the early 1950's. Price changes since that time should result in greater savings than those indicated. Technological change also probably increased the optimum size of plant.

The following considerations concern size only. Of course, all small dairy plants do not have higher per unit costs than large plants since factors other than size determine costs. However, given that manage-
ment and other factors are not considerations, these figures indicate possible gains.

Significant cost advantages exist for large butter-nonfat dry milk plants. Processing costs per cwt. of milk for a plant receiving more than 250 million pounds of milk annually may be as much as 29.7 cents lower than for a plant receiving less than 25 million pounds of milk annually (table 16). These figures indicate that dairy plants with an annual intake of over 100 million pounds of milk are near the optimum level of costs. Therefore, other factors such as exceptional management and location could make all plants above this size competitive in terms of cost. Plants below this volume are not likely to offset the economies of large size.

In 1961, only 17 of Minnesota’s 78 butter-powder and specialized powder plants received more than 100 million pounds of milk. Costs for butter-powder plants may not be representative of costs of spe-

Table 16. Cost reductions associated with variation in size of butter-nonfat dry milk plants

<table>
<thead>
<tr>
<th>Annual milk intake</th>
<th>Estimated amount by which processing cost per cwt. of whole milk exceeds that of the largest size plants</th>
</tr>
</thead>
<tbody>
<tr>
<td>- - 1,000 pounds - -</td>
<td>- - cents - -</td>
</tr>
<tr>
<td>Under 25,000</td>
<td>29.7</td>
</tr>
<tr>
<td>25,000-49,999</td>
<td>14.0-20.2</td>
</tr>
<tr>
<td>50,000-74,999</td>
<td>3.7-10.4</td>
</tr>
<tr>
<td>75,000-99,999</td>
<td>3.1-5.2</td>
</tr>
<tr>
<td>100,000-149,999</td>
<td>2.8</td>
</tr>
<tr>
<td>150,000-199,999</td>
<td>2.2-2.5</td>
</tr>
<tr>
<td>200,000-249,999</td>
<td>1.7-1.9</td>
</tr>
<tr>
<td>250,000-299,999</td>
<td></td>
</tr>
</tbody>
</table>

Source: Calculated from data in (45).

Table 17. Cost reductions associated with variation in size of whole milk creameries

<table>
<thead>
<tr>
<th>Annual volume of butter</th>
<th>Estimated amount by which cost per pound of butter exceeds that of largest size plants</th>
</tr>
</thead>
<tbody>
<tr>
<td>- - pounds - -</td>
<td>- - cents - -</td>
</tr>
<tr>
<td>Under 500,000</td>
<td>5.53-7.17</td>
</tr>
<tr>
<td>500,000-999,999</td>
<td>2.00-3.76</td>
</tr>
<tr>
<td>1,000,000-1,499,999</td>
<td>1.65-1.99</td>
</tr>
<tr>
<td>1,500,000-2,499,999</td>
<td>0.78-1.31</td>
</tr>
<tr>
<td>2,500,000-3,499,999</td>
<td>0.53-0.76</td>
</tr>
<tr>
<td>3,500,000-4,499,999</td>
<td>0.00-0.43</td>
</tr>
<tr>
<td>4,500,000 and over</td>
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</tr>
</tbody>
</table>

Source: Calculated from data in (24).
Table 18. Cost reductions associated with variation in size of plants for fluid milk processing

<table>
<thead>
<tr>
<th>Annual volume of milk processed by the plant</th>
<th>Estimated amount by which processing cost per pound of milk exceeds that of largest size plant</th>
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</thead>
<tbody>
<tr>
<td>--- pounds ---</td>
<td>--- cents ---</td>
</tr>
<tr>
<td>Paper packaging operation:</td>
<td></td>
</tr>
<tr>
<td>Less than 6,292,000</td>
<td>0.58</td>
</tr>
<tr>
<td>6,292,000 - 13,252,000</td>
<td>0.27</td>
</tr>
<tr>
<td>13,252,000 and over</td>
<td></td>
</tr>
<tr>
<td>Glass bottling operation:</td>
<td></td>
</tr>
<tr>
<td>Less than 3,540,000</td>
<td>0.65</td>
</tr>
<tr>
<td>3,540,000 - 9,640,000</td>
<td>0.49</td>
</tr>
<tr>
<td>9,640,000 and over</td>
<td></td>
</tr>
</tbody>
</table>

Source: Calculated from data in (28).

... specialize powder plants but they probably indicate the approximate size needed for minimum costs.16

The Minnesota butter-processing industry is not performing well on the basis of table 17 data. In 1962, 119 (34.3 percent) Minnesota creameries produced less than 500,000 pounds of butter (17). Most, if not all, of these plants were whole milk creameries. These figures indicate that per pound processing costs of these plants exceed those of the largest creameries by 5.53 to 7.17 cents. A Minnesota study listed 150 (43.3 percent) Minnesota creameries with an annual volume of butter from 500,000 to 999,999 pounds (17). These plants have production costs of 2.00 to 3.76 cents per pound above the largest creameries. Reorganization into fewer and larger plants would undoubtedly increase returns to producers and processors.

Minnesota's fluid milk industry is not nearly as important as its manufacturing milk industry but a large amount of fluid milk is processed in small inefficient plants. Table 18 data indicate that over 10 million pounds of fluid milk annually are needed for efficient operation. In 1962, 83.2 percent of all fluid milk operations in Minnesota operated at a smaller volume (13). Although they processed only 20.3 percent of the fluid milk, this totaled roughly 251 million pounds of milk. A lowering of processing cost of 0.25 to 0.65 cents per pound of milk could mean an increased pay price to producers and return to processors.

Size requirements for efficient operation of cheese plants are not as high as for other manufactured dairy products. Figures in table 19 show no cost advantage beyond an annual volume of 1 million pounds of cheese.

Cost savings from increased volume in ice cream plants are shown in table 20. These are costs for labor and equipment only but they are quite large. A plant with a volume of 500,000 gallons annually could

--- For data on costs in specialized drying plants, see (22).
undersell a competitor by 12.8 cents per gallon plus other savings which might accrue because of size in regard to selling, purchasing of raw materials and supplies, and advantages of specialized management. A Wisconsin study reported similar large per unit cost savings as volume of ice cream output was increased (8).

Advantages of Size in Distribution

Processing is not the only phase of dairy marketing where size has advantages. Size advantages in distribution may be just as important; requirements may be even greater than for processing. However, the firm may be the unit requiring size rather than the plant.

Many dairy firms avoid distribution beyond the processing plant. They sell the product to wholesalers or jobbers who specialize in the distribution function. Other firms belong to cooperative marketing associations that specialize in distribution.

Table 19. Cost reductions associated with variation in size of plant for cheese manufacturing

<table>
<thead>
<tr>
<th>Annual volume of cheese manufactured by the plant</th>
<th>Estimated amount by which cost per pound of cheese exceeds that of plant with output in excess of 1 million pounds annually</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 249,999</td>
<td>0.91</td>
</tr>
<tr>
<td>250,000 - 499,999</td>
<td>0.55</td>
</tr>
<tr>
<td>500,000 - 999,999</td>
<td></td>
</tr>
<tr>
<td>1,000,000 and above</td>
<td></td>
</tr>
</tbody>
</table>

Source: Calculated from data in (41).

Table 20. Cost reductions associated with variation in size of ice cream manufacturing plant

<table>
<thead>
<tr>
<th>Annual volume of ice cream</th>
<th>Estimated amount by which processing cost per gallon of ice cream exceeds that of largest plants*</th>
</tr>
</thead>
<tbody>
<tr>
<td>100,000</td>
<td>12.8</td>
</tr>
<tr>
<td>200,000</td>
<td>4.3</td>
</tr>
<tr>
<td>300,000</td>
<td>2.0</td>
</tr>
<tr>
<td>400,000</td>
<td>1.2</td>
</tr>
<tr>
<td>500,000</td>
<td></td>
</tr>
</tbody>
</table>

*Only labor and equipment are included in these figures. There may be additional savings due to largescale buying of raw materials, large sales organizations, and specialization of management.

Source: Calculated from data in (43).
Apparently, manufacturing dairy firms which are successful in marketing beyond the processing plant have several characteristics:

1. They have large financial resources and strength that allow them to grant credit to customers. They can hold large inventories which are often necessary to effectively merchandise a product.

2. They supply a standardized product in a national market. They have quality control programs designed to assure consumers and retailers of consistent quality throughout the nation.

3. They often meet the demands of large chain stores and institutions on timing, quality, and quantity. Therefore, they may need warehouses and regional sales offices; only large firms can develop such organizations.

4. These firms do their own packaging in consumer-sized units. Equipment and space for cheese and instantized powder packaging may be costly. For example, the minimum size requirement for cheese processing is not large, but a packaging operation requires a volume several times as large to operate efficiently. Similarly, many butter operations are too small to install a printing operation. Therefore, large firms are usually in a better position to undertake these functions.

5. These firms advertise to great proportions of the population through mass media. Although the cost is high, large firms can distribute such costs over a large volume of business.

Large size is almost a necessity to develop any of these characteristics. Some small firms can meet small specialized demands but such opportunities are limited.

Advantages of Size for Milk Assembly

Size requirements necessary for lowest cost milk assembly are difficult to assess; little work has been done in this area. Most studies of assembly costs for milk focused on factors other than optimum size of procurement area for each plant (46). Important factors that determine assembly cost are: density of milk production in the assembly area, amount of overlapping of procurement routes, size of trucks, and use of bulk or can pickup.

A University of Minnesota study of milk assembly costs included interplant hauling of milk, farm to plant hauling, processing costs, and optimum size of butter-powder plants and their assembly areas (45). The variable that most affected interplant hauling costs was truck size. It was more important than volume of milk hauled or distance travelled each month. Large dairy plants and firms are usually in a better position to use large trucks. They can efficiently coordinate assembly operations so that large units can be used.

From three models of farm milk assembly areas, Thompson found density of milk producers to be the most important factor affecting cost
of farm assembly. Size of producers also affected costs of assembly (45).

Furthermore, Thompson estimated optimum size of processing plant and assembly areas. For example, in an area with two farmers per square mile, each producing 250 pounds of milk per day, the optimum size butter-powder plant had a daily capacity of 820,000 pounds and assembly areas were 1,648.5 square miles (45). Many Minnesota butter-powder plants are below this size. Some may assemble milk in areas this large but they compete with others for the milk. Therefore, density of producers who ship milk to a specified plant could often be near the assumed level. Both per unit assembly costs and processing costs can be reduced by reorganization of these plants into fewer and larger units.

**Methods of Reorganization**

Several methods of reorganization to attain economies of size in the dairy industry may be used. One method is simply to wait until small inefficient firms and plants are forced out of business. However, two other methods are probably more acceptable adjustments:

1. Smaller firms could merge in order to obtain necessary size.

2. The existing firm may join or form cooperative type organizations to assist in processing and marketing operations or to jointly market products beyond the processing plant.

Merging of firms is an important reorganization method. However, Minnesota’s dairy industry is behind industries in other states in making this change. For example, 29.1 percent of all dairy firms that left the industry in Wisconsin from 1940-60 left through merger. During the same time, only 15.5 percent of Minnesota’s firms used the merger route (18).

Merger has many advantages over internal methods of growth (19):

- There is the cost advantage. If additional equipment and facilities are needed, they may be purchased through merger at less cost than new. Growth through aggressive competitive methods also may be costly.
- Merger directly eliminates a firm, so remaining firms have room to expand.
- Merger provides a greater certainty of growth because results of internal growth through promotional programs and aggressive competition depend on reactions of other firms.
- Key management and production personnel may be obtained.
- Cash outlays may sometimes be avoided by merger through stock changes.
- Access to desirable markets not otherwise available may be gained.
For firms being acquired in merger, the method may be the most remunerative for owners (18).

The structure of the Minnesota dairy industry should be conducive to merger. Most creameries and drying plants are cooperatives. Therefore, they do not face merger problems of privately owned dairy operations. Owners of private operations may have to decide on leaving the dairy industry. Former owners of cooperatives become owners in consolidated operations. Merger of cooperatives may be locked on as cooperation on a large scale. Of course, cooperative mergers do involve some problems.

As stated earlier, size requirements for distribution and sales beyond the plant may be much larger than the size required for processing efficiency. This large size is necessary in order to: meet demands for consistent quality, supply needs of large food chains, develop and promote brands, and support specialized sales departments. Not all firms must be individually large enough to attain these advantages—they can be attained through cooperative-type arrangements.

The Quality Chekd Association assists noncooperative dairy firms to achieve advantages of largescale operations but does not require complete merger (38). Members merchandise and advertise dairy products under a common trademark. Their largescale purchasing of supplies results in quantity discounts. The Association provides services such as research, testing, production counseling, training programs for personnel, quality control services, and news reporting (38). Each member has an exclusive franchise to deal in a specified market.

Land O'Lakes Creameries, Inc., is another type of cooperative marketing association. Not only does it manufacture large amounts of dairy products, it also markets the products for member creameries. So the creamery or butter-powder plant that can efficiently process products can take advantage of the large size needed to effectively market these products beyond the plant level. Products are advertised nationally and there are regional sales offices.

Increased use of such dairy marketing agencies may be preferred to other reorganization methods for one important reason: small firms can survive, which may be both socially and economically desirable, and still have economies of size realized in many marketing functions.

Reorganization is needed in Minnesota's dairy industry for greater efficiency. Research to measure dollar costs of inefficiency may help stimulate appropriate reorganization. In addition to greater processing efficiencies, large firms are likely to be most effective in finding and developing outlets for dairy products. Large firms can employ specialized talent and techniques. Where large investments in products and market research are needed, large firms generally are in the most favorable financial position.
Summary And Conclusions

This report identifies some major problems of marketing and research needs of the Minnesota dairy industry. Minnesota has a large stake in the future of the dairy industry. The problems are by no means new to the industry; they have been the subject of numerous studies. This report describes the problems most important to Minnesota and indicates areas where additional marketing research would be beneficial. Some major problem areas are:

1. Major changes taking place in consumption of various dairy products require changes in the traditional structure of Minnesota's dairy industry. The whole milk equivalent of all milk consumed on a per capita basis declined from 691 pounds in 1953 to 636 pounds in 1962. Butter consumption, at 7.2 pounds in 1962, continues to decline so greater relative emphasis may have to be placed on other manufactured dairy products.

2. Class I (fluid) utilization in many large federal order milk markets has declined substantially. If this decrease results from production increases in these areas, additional quantities of milk go into manufactured milk product markets—the only markets available for 80-90 percent of milk produced in Minnesota.

3. State milk control laws can affect dairy product markets, although court decisions have considerably restricted the kinds and extent of control. Nineteen states currently regulate producer milk prices. States near large alternative milk supplies are not generally successful in raising prices above competitive levels through control laws. However, states that are remote from alternative supplies have experienced greater success with price controls.

4. Sanitary regulation can be used to achieve economic advantages for local producers in some fluid milk markets. Acceptance of the U.S. Public Health Model Ordinance and Code has provided sanitary ratings for milk moving in interstate trade to distant fluid milk markets. However, this rating is not accepted by all health authorities.

5. The impact of transportation rates and regulations on movements of milk products in interstate trade is a relatively unexplored field. Differing weight restrictions for trucks among states may affect movements of both manufactured and fluid milk products.

Various proposals have been offered for improving the market position of Minnesota's dairy industry. Increased promotional activity, product development, and improvement in sanitary requirements for manufacturing grade milk may increase the demand for milk. Promotion increased the demand for sour cream 100 percent in the Minneapolis-St. Paul market and 71 percent in the Des Moines market. Development of
an acceptable milk concentrate may expand markets. For example, improved manufacturing grade milk standards could improve Minnesota’s competitive position in markets for dry milk used for fortification.

Policies to reduce the number of dairy plants and to increase average size have potential for reducing per unit marketing costs. To the extent that savings are not retained by marketing firms, milk producers can benefit through increased sales or increased prices. Many butter, nonfat dry milk, and fluid milk plants in Minnesota are too small to achieve the minimum level of unit costs. Some creameries operate at a volume which results in costs as much as 7 or more cents per pound above the minimum. Small butter-powder plants may have processing costs as high as 30 cents per cwt. of whole milk above the minimum.

This report presents a cursory examination of important problems of Minnesota’s dairy industry. Although probably more questions are raised than answered, some important research needs are suggested. Some of these needs are:

- Study of the effect of administered pricing on supply areas for milk and milk products. Both state and federal pricing could be included. Answers to the following questions would be useful when Minnesota interests appear at federal order hearings: Have milk prices been raised in major fluid milk-producing areas at the expense of traditional manufacturing milk areas? If so, how much have these prices increased production in excess of what it would have been without federal control?

- Study of the impact of transportation rates costs and regulations on movements of fluid and manufactured dairy products. Would more Minnesota dairy products move under alternative levels of rates? Rates and costs greatly affect the movement of fluid milk but how important are they in determining markets and production locations of manufactured dairy products such as ice cream, cottage cheese, cheese, butter, powder, and evaporated milk?

- Study of the extent of exclusion of Minnesota dairy products from markets because of sanitary requirements. If regulations are designed to achieve economic objectives, what action should be taken to eliminate the restrictions? If Minnesota products are justifiably restricted because health standards for production and processing Minnesota products are too low, what changes are necessary?

- Study of demands for dairy products, particularly manufactured products. With such information, accurate forecasts might be made of future total demand and appropriate programs for expanding demand could be developed. For example, what are the demands for butter? Can total demand be classified into home-use demand, institutional-use demand, and commercial-use demand? What has happened to each demand? Studies could include research on the potential of promotion to expand demands for dairy products.
- Study of costs of inefficiency in the Minnesota dairy-processing industry to point out the gain of reorganization.

- Study of an optimal solution for milk prices and production for the nation with the assumption of no institutional restrictions on product movements. This could be especially useful when Minnesota is represented at federal order hearings.

Many other problem areas also need research. In fact, there is still a need to delineate problems of the industry and decide how they might be studied. A seminar or workshop could be held where informed dairy producers and industry, government, and university people could give their views. Possibly, this meeting should be held on a regional basis; Minnesota, Wisconsin, Michigan, Iowa, North Dakota, and South Dakota may have a community of interest in many problems.

Economic research in the dairy industry is a key tool in developing markets and increasing efficiency of the market system. Suggestions made in this report concern those areas of market research which would provide fruitful results for the Minnesota dairy industry.

Trade names are used for convenience; mention of a product does not imply endorsement; no criticism is implied of products not mentioned.
## Appendix table 1. Average prices received by Minnesota farmers for selected products, 1934-63

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<thead>
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<tbody>
<tr>
<td></td>
<td>dollars</td>
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<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Milk, wholesale (cwt.)</td>
<td>1.75</td>
<td>3.32</td>
<td>3.18</td>
<td>3.12</td>
<td>3.12</td>
<td>3.19</td>
<td>3.21</td>
<td>3.09</td>
<td>3.11</td>
<td>3.16</td>
<td>3.25</td>
<td>3.20</td>
<td></td>
</tr>
<tr>
<td>Butterfat (lb.)</td>
<td>0.34</td>
<td>0.71</td>
<td>0.64</td>
<td>0.65</td>
<td>0.63</td>
<td>0.64</td>
<td>0.65</td>
<td>0.64</td>
<td>0.64</td>
<td>0.66</td>
<td>0.64</td>
<td>0.64</td>
<td></td>
</tr>
<tr>
<td>Cattle (cwt.)</td>
<td>7.36</td>
<td>18.56</td>
<td>18.66</td>
<td>16.10</td>
<td>15.40</td>
<td>14.70</td>
<td>16.90</td>
<td>21.70</td>
<td>22.20</td>
<td>20.40</td>
<td>19.80</td>
<td>20.70</td>
<td>18.70</td>
</tr>
<tr>
<td>Eggs (doz.)</td>
<td>0.204</td>
<td>0.364</td>
<td>0.281</td>
<td>0.292</td>
<td>0.326</td>
<td>0.319</td>
<td>0.283</td>
<td>0.296</td>
<td>0.229</td>
<td>0.274</td>
<td>0.273</td>
<td>0.259</td>
<td>0.256</td>
</tr>
<tr>
<td>Turkeys (lb.)</td>
<td>0.192</td>
<td>0.357</td>
<td>0.238</td>
<td>0.274</td>
<td>0.292</td>
<td>0.262</td>
<td>0.222</td>
<td>0.241</td>
<td>0.227</td>
<td>0.253</td>
<td>0.176</td>
<td>0.211</td>
<td>0.224</td>
</tr>
</tbody>
</table>

Sources (33).

## Appendix table 2. Quantity of selected farm products equal in value to 100 pounds of milk, Minnesota, 1934-63

<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Butterfat (lb.)</td>
<td>5.2</td>
<td>4.7</td>
<td>5.0</td>
<td>5.0</td>
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<tr>
<td>Cattle (lb.)</td>
<td>24.0</td>
<td>18.0</td>
<td>17.0</td>
<td>17.0</td>
</tr>
<tr>
<td>Calves (lb.)</td>
<td>20.0</td>
<td>15.0</td>
<td>14.0</td>
<td>13.0</td>
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<tr>
<td>Hogs (lb.)</td>
<td>20.0</td>
<td>18.0</td>
<td>20.0</td>
<td>22.0</td>
</tr>
<tr>
<td>Eggs (doz.)</td>
<td>8.6</td>
<td>9.1</td>
<td>11.3</td>
<td>12.5</td>
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<tr>
<td>Turkeys (lb.)</td>
<td>9.1</td>
<td>9.3</td>
<td>13.4</td>
<td>14.3</td>
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</tbody>
</table>

*Calculated from data in appendix table 1.
### Appendix table 3. Average wholesale prices for all milk, United States and Minnesota, 1934-63

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Milk, wholesale, Minnesota (dollars per cwt.)</td>
<td>1.75</td>
<td>3.32</td>
<td>3.18</td>
<td>3.12</td>
<td>3.12</td>
<td>3.19</td>
<td>3.21</td>
<td>3.09</td>
<td>3.11</td>
<td>3.16</td>
<td>3.35</td>
<td>3.20</td>
<td></td>
</tr>
<tr>
<td>Milk, wholesale, United States (dollars per cwt.)</td>
<td>2.03</td>
<td>4.11</td>
<td>4.12</td>
<td>3.97</td>
<td>4.01</td>
<td>4.14</td>
<td>4.21</td>
<td>4.13</td>
<td>4.16</td>
<td>4.21</td>
<td>4.10</td>
<td>4.10</td>
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</tr>
<tr>
<td>Ratio of Minnesota wholesale price to U. S. price</td>
<td>0.86</td>
<td>0.81</td>
<td>0.77</td>
<td>0.79</td>
<td>0.78</td>
<td>0.77</td>
<td>0.76</td>
<td>0.75</td>
<td>0.75</td>
<td>0.75</td>
<td>0.79</td>
<td>0.78</td>
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</tr>
</tbody>
</table>

Source: (33) and (49).

### Appendix table 4. Ratios of Minnesota wholesale milk price to U. S. wholesale price, 1948-63

<table>
<thead>
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<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Milk eligible for fluid market</td>
<td>0.85</td>
<td>0.79</td>
<td>0.81</td>
<td>0.84</td>
<td>0.86</td>
<td>0.83</td>
<td>0.82</td>
<td>0.83</td>
<td>0.79</td>
<td>0.78</td>
<td>0.79</td>
<td>0.80</td>
<td>0.82</td>
<td>0.79</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manufacturing grade milk</td>
<td>0.89</td>
<td>0.92</td>
<td>0.92</td>
<td>0.91</td>
<td>0.91</td>
<td>0.95</td>
<td>0.96</td>
<td>0.94</td>
<td>0.94</td>
<td>0.94</td>
<td>0.95</td>
<td>0.94</td>
<td>0.97</td>
<td>0.99</td>
<td>0.97</td>
<td></td>
</tr>
</tbody>
</table>

Source: Calculated from data in (49).
Literature Cited


