OUR INDUSTRY TODAY

High Fat Milk Products—A Perspective

S. T. COULTER

Department of Dairy Industries, University of Minnesota, Saint Paul

Declining per capita consumption in the United States of butter and cream, and consequently of total milk fat, is of great concern to all having any financial or emotional attachment to the dairy industry. The recipient of an invitation from this group to discuss what might be done to reverse this trend has a feeling of gratification that the Committee conceived his remarks might have merit, but at the same time is more than a little humble because he has some knowledge of the enormity and complexity of the problem and is not certain of their resolution.

Domestic per Person Consumption

Milk fat. The dimensions of the decline are too well known to justify more than a brief recapitulation. Per capita consumption data for butter, fluid cream, ice cream, cheese, milk fat, and nonfat solids are shown in Table 1, in the form of indexes. Butter consumption, as everyone knows, has declined drastically. A per person use in 1964 of only 63% of that in 1947-49 reveals only part of the drop, as this neglects the fact that butter was a World War II casualty. Per person use in 1964 was only 37% of that during the prewar period of 1925-29. Since 1950, the data for fluid cream have been given in terms of sales; 1964 sales are only 71% of those for 1950. Although the data are not included in the table, a decrease in the fat content of fluid milk and a shift to skim milk or the 2% fat product represent a material decrease in per person use of milk fat.

On the other hand, milk fat utilization has been very favorably influenced by the large increase in ice cream consumption. For ice cream and related products the per person index is 120, using 1947-49 as the base and 237 with 1935-39 as the base. Cheese consumption has increased steadily for several decades. The increase since 1947-49 has been at a somewhat faster rate, index 137, than that of ice cream, but more slowly over the longer period.

TABLE 1
Trends in the per person consumption of milk fat, solids-not-fat, and selected dairy products

<table>
<thead>
<tr>
<th>Year</th>
<th>Milk fat</th>
<th>Solids-not-fat</th>
<th>Butter</th>
<th>Cream</th>
<th>Ice cream</th>
<th>Cheese</th>
</tr>
</thead>
<tbody>
<tr>
<td>1925-29 Average</td>
<td>107</td>
<td>81</td>
<td>170</td>
<td>......</td>
<td>50</td>
<td>66</td>
</tr>
<tr>
<td>1935-39 Average</td>
<td>107</td>
<td>86</td>
<td>160</td>
<td>......</td>
<td>51</td>
<td>80</td>
</tr>
<tr>
<td>1940</td>
<td>110</td>
<td>89</td>
<td>160</td>
<td>......</td>
<td>60</td>
<td>86</td>
</tr>
<tr>
<td>1945</td>
<td>107</td>
<td>106</td>
<td>103</td>
<td>......</td>
<td>98</td>
<td>96</td>
</tr>
<tr>
<td>1947-49 Average</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>......</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>1950</td>
<td>100</td>
<td>99</td>
<td>101</td>
<td>100</td>
<td>95</td>
<td>110</td>
</tr>
<tr>
<td>1951</td>
<td>96</td>
<td>102</td>
<td>91</td>
<td>100</td>
<td>98</td>
<td>103</td>
</tr>
<tr>
<td>1952</td>
<td>93</td>
<td>103</td>
<td>81</td>
<td>95</td>
<td>102</td>
<td>109</td>
</tr>
<tr>
<td>1953</td>
<td>91</td>
<td>102</td>
<td>80</td>
<td>93</td>
<td>104</td>
<td>107</td>
</tr>
<tr>
<td>1954</td>
<td>92</td>
<td>102</td>
<td>84</td>
<td>88</td>
<td>103</td>
<td>113</td>
</tr>
<tr>
<td>1955</td>
<td>92</td>
<td>104</td>
<td>85</td>
<td>87</td>
<td>107</td>
<td>113</td>
</tr>
<tr>
<td>1956</td>
<td>91</td>
<td>104</td>
<td>82</td>
<td>88</td>
<td>109</td>
<td>114</td>
</tr>
<tr>
<td>1957</td>
<td>88</td>
<td>103</td>
<td>78</td>
<td>86</td>
<td>109</td>
<td>110</td>
</tr>
<tr>
<td>1958</td>
<td>87</td>
<td>102</td>
<td>78</td>
<td>84</td>
<td>108</td>
<td>116</td>
</tr>
<tr>
<td>1959</td>
<td>85</td>
<td>101</td>
<td>75</td>
<td>82</td>
<td>115</td>
<td>114</td>
</tr>
<tr>
<td>1960</td>
<td>83</td>
<td>101</td>
<td>71</td>
<td>82</td>
<td>115</td>
<td>120</td>
</tr>
<tr>
<td>1961</td>
<td>81</td>
<td>99</td>
<td>70</td>
<td>79</td>
<td>115</td>
<td>121</td>
</tr>
<tr>
<td>1962</td>
<td>80</td>
<td>98</td>
<td>67</td>
<td>77</td>
<td>117</td>
<td>130</td>
</tr>
<tr>
<td>1963</td>
<td>79</td>
<td>97</td>
<td>64</td>
<td>75</td>
<td>119</td>
<td>133</td>
</tr>
<tr>
<td>1964</td>
<td>79</td>
<td>97</td>
<td>63</td>
<td>71</td>
<td>120</td>
<td>134</td>
</tr>
</tbody>
</table>

* Sales.
* Index of Sales 1950 = 100.
Milk solids-not-fat. Despite increases in use of ice cream and cheese, total per person consumption of milk fat has decreased to 79% of the 1947-49 base. Per person consumption of nonfat solids has remained almost stationary since 1947-49, index 97, but has increased considerably since 1925-29, index 119. Per person use does not, of course, reveal the entire story, as this neglects the very great increase in the number of persons. Total milk production has increased about 10% since 1947-49, but the production per person has declined to 52% of the 1947-49 level.

Average milk contains milk fat and solids-not-fat in the ratio of about 1 to 2.3. Domestic per capita consumption in 1925-29 was in the ratio of 1 to 1.1 and, in 1964, 1 to 1.8. The fact that this marked shift in the ratio of consumption could occur without even more serious dislocations in the industry was possible because of the large reservoir of skim milk on the farm which, starting just prior to World War II and extending to the present, has now been diverted almost completely to human consumption. Thus, nonfat solids for the increased domestic consumption, as well as large quantities for export, have come from this source. Nevertheless, in terms of percentage of the production consumed by humans domestically, that of milk fat exceeds nonfat solids.

Nonfat dry milk and butter manufacture. In practice, butter is the market of last resort. If the fat cannot be used for other purposes, it is made into butter. Increases in ice cream and fluid cream consumption divert fat from the butter market. The situation with respect to cheese is less clear. Cheese, other than Cottage, is a high-fat product, in that the ratio of fat to solids-not-fat in the cheese exceeds that in milk. It might be thought, therefore, that an increase in cheese consumption diverts fat from butter. Cheese is made from whole milk or from milk standardized to a lower than normal fat content. Also, the whey is separated, yielding substantial quantities of fat ultimately for butter manufacture. Thus, although an increase in cheese consumption increases total fat utilization, it results in the release of some fat for butter production. Of course, since butter is the market of last resort for the fat and nonfat dry milk for the solids-not-fat, a decrease in cheese production at a constant level of milk production would result in more butter and nonfat dry milk.

Although some adjustments must be made for the fat from cheese manufacture, and the balancing of the solids-not-fat and fat used in fluid milk and cream, ice cream, evaporated milk and the like, nonfat dry milk essentially is a by-product of butter manufacture. It is difficult to conceive how we could have substantial quantities of nonfat dry milk at a price at which it would be sold, without the use of the counterbalancing fat in butter or some other high-fat product which returns a sufficiently high price to bear a substantial part of the cost of milk production. At an Association symposium at the Annual Meeting at Purdue two years ago, I pointed out that for milk used for fluid purposes or for the manufacture of cheese, theoretically it would be possible to assign almost any value to the fat and the solids-not-fat, compatible with a reasonable total price for the milk. The price of nonfat dry milk, on the other hand, could not be increased sufficiently to permit substantial reduction in the price of butter without seriously reducing the sale of the dry milk product. Presumably, the producer has no interest in the ultimate use of milk, except as this influences the price received. Producers in many sections of the country do not feel the full impact of the declining use of butter and cream because, in effect, they are importing rather than exporting areas and do not manufacture butter. This suggests that we could have a viable dairy industry if production were held at a level to put the country on a net importing basis. I doubt that this would be compatible with the national interest.

Export in the Public Interest

The United States is not an island isolated from the food supplies of the world or immune to the need for food in other parts of the world. Concurrent with this meeting, the International Relations Committee is sponsoring a symposium dealing with milk and milk production in the world food supply. The United States, New Zealand, and Australia are the only areas in the world currently blessed with a surplus of food and are the only areas having substantial quantities of surplus dairy products. Surplus nonfat dry milk from this country has become perhaps the most important item in this country's Food for Peace program. As such, it has been introduced into the diets of people in many countries. Commercial exports increased from 201.1 million pounds in 1963 to 496.8 million in 1964. Butter from this country moved freely into export in 1964. So readily, in fact, as to indicate there no longer is a burdensome world dairy surplus. (See What Became of the World Dairy Surplus, Foreign Agriculture, United States Department of Agriculture, Foreign Agricultural Service,
The demand for nonfat milk solids should increase for many years. The number of students from other countries clamoring to enroll in dairy curricula in colleges and universities in this country is proof of interest in dairying in many regions. The extent to which this will increase world milk production still is uncertain. There is no uncertainty in the proposition that the United States should share its abundance, and no product is more needed than nonfat milk solids. Surpluses in the future may only be moderate, but whether great or large must be expected if domestic needs are supplied. The export experiences of last year, and studies of dairy groups, suggest that commercial export markets for milk fat can be developed although, in general, not without some form of subsidy. Criticism of fluctuating governmental policy with respect to export sales has appeared recently in the dairy press. The need for long-range planning by both government and industry is indicated.

Production solely for commercial export probably cannot be justified if subsidy is necessary. In consideration of the world food needs, subsidized export to provide a stabilized market for the surplus required, if domestic requirements are to be met from domestic production, is in the public interest.

**Total Fat Consumption**

A brief reference to fat consumption in general is relevant. Total per person calorie consumption has decreased at a rate roughly paralleling the decline in physical labor. Despite the very considerable anti-fat propaganda, there has been no material change in the total contribution of fats (40-45% average) to the apparent calorie intake. There has been some shift from animal fats to vegetable oils as a result of the premature conclusion of some researchers associating the consumption of animal fats with atherosclerosis and the resultant sales promotion programs of vegetable oil processors. In any event, since public health officials will continue to emphasize the advantage of leanness and physical fitness, an over-all decrease in the per person consumption of fats, whether animal or vegetable, must be expected. This conclusion has significance because, if true, any increase in per person use of milk fat must be at the expense of other fats. The decrease in the consumption of milk fat, of course, has resulted largely from the substitution of other fats. Can we now, in effect, reverse the situation and substitute milk fat for other fats or, stated differently, regain lost markets?

**Needed Research**

The foregoing has been presented simply to establish a reasonable basis for the discussion to follow, which primarily will attempt to respond to the charge of your Committee with respect to the question, Can high-fat milk products have an expanding future? Implicit in the charges of your Committee were questions such as: What research is needed? What products should be developed? Are there new and different uses for milk fat? These are reasonable questions in a society as new-product- and advertising-conscious as ours.

**Specific requirements of man for fats.** The first question can, in part, be answered with some degree of certainty. Because of its present and potential effect on fat consumption, no other applicable research rivals in importance that which may be categorized as the specific requirements of man for fats for optimum nutrition. The dairy industry is, of course, providing substantial support for such research, possibly quite adequately so, considering the large sums available for this work from governmental sources. The real problem is the basic cause of atherosclerosis. This is not likely to be discovered by comparing the diets of different groups of people and, once discovered, correction is not likely to be dependent upon emphasis on one type of fat in the diet. However confident we may be of the ultimate favorable resolution of the issue, we must recognize its existence and meet it with reason, not emotion.

**Does milk fat have unique properties?** Other suggestions for research may be more controversial. Prior to the onslaught of the proponents of the cholesterol theory on animal fats, participants in any discussion of needed dairy research were likely to be besieged with a plea to find some factor in milk fat which would prove its nutritional superiority to other fats. H. H. Sommer more than 20 years ago pointed out the futility of this type of research since, if a factor were discovered, almost certainly other fats could be fortified to provide similar nutritional qualities. Does milk fat possess unique properties? Sommer stated on many occasions that flavor was the distinguishing characteristic of milk fat. Undoubtedly, this fact comes principally from the wide range of constituent fatty acids, especially the low molecular weight acids, whose presence in sizable percentages renders milk fat unique among...
natural fats. The diversities in fatty acid constitution and in glyceride structure also are responsible for the highly desirable physical properties of properly made butter. Variability in fatty acid constitution from lot to lot, however, is a minus factor in the butter industry and limits the utility of milk fat for some cooking purposes. Actually, research on the control of the physical characteristics of butter is far ahead of application.

Do we know enough about milk fat and its use to capitalize on all of the inherent qualities? Newer, faster, and more precise methods of analysis have facilitated accumulation of basic chemical data; thus, a great deal is known about the composition and structure of various lots of milk fat, as well as the effects of feed and various other environmental factors. What fatty acid constitution and glyceride structure would be optimum for different uses, or does variation make any difference? We know that the composition of the available fat is often less than ideal for butter manufacture. Research has made it possible to duplicate synthetically many of the qualities of butter; nevertheless, margarine manufacturers still have interest in combinations of butter and margarine for reasons including the contribution of butter to the flavor of the mixture.

What, specifically, other than flavor, are the virtues or limitations of milk fat in deep-fat frying, in pastry, in candy and other products? Do the low molecular weight fatty acids contribute special properties to various foods other than through their effect on the melting point of the fat? The characteristic flavor of Blue or Roquefort cheese would not be possible except for the low molecular weight fatty acids. The chemistry of the flavor of other cheese is less well known. Can other desirable flavors be developed by microbial action or directly by enzyme action on the fat of milk, either alone or in the presence of other milk constituents, as in cheese? A systematic survey of the decomposition products of individual fatty acids might be a starting point. To what extent is it possible by breeding, feeding, or management, to control the fatty acid constitution and glyceride structure of milk fat? Much information is available, but certainly not all that could be wanted. Any direct application of such information to alter the fatty acid constitution of milk fat, however, is premature until the composition and structure desired are known.

Exploitation of known properties. Perhaps greater utilization of milk fat is not so much limited by lack of knowledge of the chemistry of fat as by the failure to appreciate and exploit those qualities which are well known. The American Dairy Association is among those pointing out the trend in this country toward gourmet cookery. Surely, an active interest that food be pleasing, as well as nutritious, is to be expected and desired in an affluent society blessed with an abundance of agricultural production. Inexcusable if associated with gluttony, it is pardonable even in an esthete if combined with a program of physical fitness. Inevitably, milk fat will be high in price in relation to vegetable fats unless, of course, its cost is subsidized by some means. This can lead to the too simple conclusion that milk fat can be justified only for its gourmet qualities. This neglects again the fact that fat is only one of the constituents of milk, and if we are to have milk we must also have milk fat. Nevertheless, the unique flavor and physical properties of milk fat are the foundation upon which much of the sales promotion programs must be based.

Attempts to merchandise brand-name butters on the basis of exceptional flavor or body qualities have not been conspicuously successful. Perhaps this is because the superiority of the qualities advertised were not as conspicuous to the consumer as to the sales or production departments or, at best, not as consistent as desired. Perhaps, also, there is less than optimum interest on the part of the manufacturer in quality, other than it be adequate to meet USDA grade specifications. Thus, an item bought by the consumer largely for its gourmet qualities is produced not to be as good as it reasonably might be expected to be, but only good enough to sell to the government. Also, although sold for two or three times the price of the competing product, butter is often less well packaged and merchandised. One of my own pet peeves is the way butter is handled in most restaurants. The water-bleached slivers dispensed by hand or fork are neither attractive nor sanitary. Packaging costs would be more for individually foil-wrapped pats and the pats probably larger. I suspect any higher cost to the restaurant would be offset by savings in labor and in wastage. Today the restaurant is the only place many people use or even see butter. Most butter made in the United States is basically good, in that the fat came from good-met cookery. Surely, an active interest that food be pleasing, as well as nutritious, is to be expected and desired in an affluent society blessed with an abundance of agricultural production. Inexcusable if associated with gluttony, it is pardonable even in an esthete if combined with a program of physical fitness. Inevitably, milk fat will be high in price in relation to vegetable fats unless, of course, its cost is subsidized by some means. This can lead to the too simple conclusion that milk fat can be justified only for its gourmet qualities. This neglects again the fact that fat is only one of the constituents of milk, and if we are to have milk we must also have milk fat. Nevertheless, the unique flavor and physical properties of milk fat are the foundation upon which much of the sales promotion programs must be based.

Attempts to merchandise brand-name butters on the basis of exceptional flavor or body qualities have not been conspicuously successful. Perhaps this is because the superiority of the qualities advertised were not as conspicuous to the consumer as to the sales or production departments or, at best, not as consistent as desired. Perhaps, also, there is less than optimum interest on the part of the manufacturer in quality, other than it be adequate to meet USDA grade specifications. Thus, an item bought by the consumer largely for its gourmet qualities is produced not to be as good as it reasonably might be expected to be, but only good enough to sell to the government. Also, although sold for two or three times the price of the competing product, butter is often less well packaged and merchandised. One of my own pet peeves is the way butter is handled in most restaurants. The water-bleached slivers dispensed by hand or fork are neither attractive nor sanitary. Packaging costs would be more for individually foil-wrapped pats and the pats probably larger. I suspect any higher cost to the restaurant would be offset by savings in labor and in wastage. Today the restaurant is the only place many people use or even see butter. Most butter made in the United States is basically good, in that the fat came from good-flavored milk or cream. Some is truly excellent. Perhaps this is because the superiority of the qualities advertised were not as conspicuous to the consumer as to the sales or production departments or, at best, not as consistent as desired. Perhaps, also, there is less than optimum interest on the part of the manufacturer in quality, other than it be adequate to meet USDA grade specifications. Thus, an item bought by the consumer largely for its gourmet qualities is produced not to be as good as it reasonably might be expected to be, but only good enough to sell to the government. Also, although sold for two or three times the price of the competing product, butter is often less well packaged and merchandised. One of my own pet peeves is the way butter is handled in most restaurants. The water-bleached slivers dispensed by hand or fork are neither attractive nor sanitary. Packaging costs would be more for individually foil-wrapped pats and the pats probably larger. I suspect any higher cost to the restaurant would be offset by savings in labor and in wastage. Today the restaurant is the only place many people use or even see butter. Most butter made in the United States is basically good, in that the fat came from good-flavored milk or cream. Some is truly excellent. Too much leaves a great deal to be desired from the standpoint of those characteristics which the old-time craftsman described under the term workmanship.

Research is not needed to correct these deficiencies. Neither do we need to change the definition and standards for butter, to produce
butter with desirable flavor, physical characteristics, and storage stability. As a matter of principle, butter should be defined by standards of identity rather than by Act of Congress. In theory, a definition established by Act of Congress can be changed only by another act. Some flexibility has been secured, however, simply by interpretation of the enforcement agency. Research has made it possible to produce butter with desirable spreadability and excellent keeping quality simply by physical means and without recourse to additives. It seems pointless, however, to stultify progress by extreme rigidity.

I believe we do need competition in the sale of butter which is based upon pride in the qualities of the product rather than in the lowness of the price. I believe we do need imagination and resourcefulness in merchandising. Major emphasis has been directed to the household user. Certainly, this should be continued, if for no other reason than to retain the image of butter as a prestige product. However, more and more eating is being transferred to the restaurant and food preparation to the factory.

New products and their uses. Competition suggests product diversity. Federal grading is not necessarily incompatible with product diversity, but does tend to create uniformity. This tendency is difficult to resist where, as in recent years, such a large percentage of production has been bought under the price support program. Product diversity creates a basis for advertising copy. One of my men friends distinguished for his knowledge of gourmet cookery, as well as of the industry, suggests herb butter as an addition to the product line. Doubtless there are others. Possibly, various flavors might more readily be introduced into low-fat spreads.

Since World War II there has been a recurrent interest in low-fat spreads. Originally arising from the desire to extend milk fat during a period of shortage due to the war, some now advocate the production of a dairy spread to meet the price competition of margarine. If a suitable product can be made using milk fat, a similar product certainly can be made incorporating vegetable fats. The spread in price between a milk fat and a vegetable fat product would, of course, decrease with a decrease in the fat content. If there is a real place for a low-fat spread, it is in response to the demand for low-calorie foods. Minimum cost would surely not be a major consideration determining the success or failure of such a product. Success would be contingent upon the existence of a real or imagined need, quality of the product, and the effectiveness of the sales program. The desire to produce a dairy spread which could be sold at a price competitive with margarine does not insure success of the product. If the consumer wants the item, he will pay a fair price. Whether the introduction of a low-fat spread would increase the total milk fat consumption in this country is uncertain.

Shift in Food Preparation to Factory

The highly successful exploitation of the gourmet qualities of butter by a Midwest manufacturer of bakery and allied products has provided an incentive to others to do likewise. For this type of bakery use, butter may be the ideal product. For incorporation into other prepared foods, butteroil or butteroil fractions, or combinations of these with other milk constituents or other ingredients in the formulation, may permit processing at a lower cost, or actually improve the product. These problems are challenges for technical sales, as well as research. Continued emphasis on convenience foods has resulted in the introduction of frozen peas and other vegetables flavored with butter sauce. Combined with other foods at the factory, the higher cost of butter is less apparent, as it is a relatively small part of the retail price. Because of the prestige value of butter, margarine is not a real competitor. The shift in food preparation from the home kitchen to the factory may be expected to continue. I believe there is more potential for increased butter consumption in this type of market than in any other. Whether the potential will be realized will depend on many factors, including the quality of the end product. Storage, as well as initial flavor characteristics, is important. Are these problems solely those of the processor of the particular food item? I think not, if the dairy industry is interested in the market. The industry must be prepared to provide technical service, suggest uses and formulations, and provide dairy products of known and constant characteristics.

There is considerable interest in dairy circles at this time in the possibility of increasing the utility of milk fat for use as a cooking or salad oil. Standardized physical characteristics and enhanced flavor stability would seem to be requisite for this purpose. The problems involved in the development of suitable products do not appear insuperable. Effective utilization of all fractions of the milk fat, if fractionation is restored to, could be one of the serious obstacles. This or other of the apparent problems should not deter adequate experimentation designed to determine what might be done and what attri-
butes milk fat might contribute which would aid
the merchandising of such products.

Cream Products

Sour cream, which satisfies another gourmet
desire, has increased in sales, whereas that of
other fluid creams has declined. Perhaps some
of the decline in cream sales can be attributed
to the anti-fat propaganda. Surely, much is
due to direct substitution of competing prod-
ucts. The substitution products have not been
a total loss to the dairy industry, since sub-
stantial quantities of caseinate or lactose, or
both, are common ingredients. The reduced
cost, as a result of the use of vegetable rather
than milk fat, is not alone responsible for the
increased sale of the so-called nondairy cream-
ing agents. Greater promotional effort is cer-
tainly a major factor. Can it be, however, that
the substitute products do have qualities that
attract the consumer? Claims include fewer
calories, longer storage life, and greater ease of
use. In our endeavor to retain the image of
cream as a natural product have we neglected
maximum utility? How many hostesses have
been less than happy with whipping cream?
How many have found the coffee cream sour
or off in flavor because of limited storage sta-
ibility? I think we, as in industry, are not
t entirely blameless. Perhaps we have been more
concerned with protecting markets than in
developing them. The defensive position in ad-
vertising is basically negative and, hence, al-
most inevitably subject to attrition.

Under existing conditions further decline in
cream sales is almost certain. What research
is needed? Possibly, very little. We have known
for years that cream products in general were
improved by increasing the solids-not-fat con-
tent and certainly cannot be uniform without
standardization. Various additives have been
used, often surreptitiously, and hence without
adequate research. My only suggestion is that
these problems be approached with an open
mind. Whatever research is necessary to pro-
vide an adequate foundation for decisions as to
formulation and processing, to produce the
several types of products desired by the con-
sumer and to create others for which a market
might be developed, is fully justified. If stan-
dardization and the use of additives are nec-
tary for this purpose, they should not be barred
by tradition.

Cheese is one high-fat product the use of
which is increasing. The increase has been
gradual over a period of several decades and
may be expected to continue. Improved prod-
ucts, greater variety, and aggressive sales pro-
grants have contributed to the increase. I have
no figures to permit an evaluation of the extent
to which the use of cheese in the preparation of
special or convenience foods is responsible, but
it must be a considerable factor. I refer to
pizza, cheese-flavored crackers, potato chips,
smack foods, macaroni, cheese sauces, etc. Here
again is a high-fat dairy product used in many
instances primarily for its unique flavor quali-
ties. Essentially, the only competitor of cheese
for these purposes is other cheese. Price is
secondary to quality considerations and the fat
content of no apparent concern.

Ice cream is another relatively high-fat dairy
product with great and increasing consumer ac-
ceptance. Ready availability and convenience,
as well as the highly pleasing flavor of ice cream,
are vitally important factors to the consumer.

Summary of Suggested Research

Thus, my thoughts with respect to the Com-
mittee's charge concerning needed research can
be summarized as follows:

1. Primary effort must continue to determine
   the specific requirements of man for fats
   for optimum nutrition.

2. Sufficient research on the chemistry and
   physical properties of milk fat and its use,
   to be reasonably certain that unique prop-
   erties and the value of these properties for
   various uses have been disclosed.

3. Support of a systematic program of prod-
   uct development and technical sales, ap-
   proached with the intent to fully exploit
   these properties. The well-established pre-
   tige value of milk fat and milk protein
   should not be neglected.

I believe the proposals and suggestions made
have merit and these are by no means a com-
plete inventory of those which might be sug-
gested. I am much less certain that conditions
within the industry will permit any consider-
able expansion either in research or sales effort.

Expansion in Research and Sales Effort

Motivation. Research on the nutritional as-
pects of fat is of intense public interest and as
a result will be adequately supported from gov-
ernmental sources. Substantial expenditures by
the industry are justified, if for no other reason
than to have a direct interest and involvement,
but neither support nor interest on the part of
the industry is an important determinant of the
extent of research effort. This research is, and
will continue to be, centered in colleges and
universities. The actual research and interpr-
etation will be done by individuals who have no
connection with the dairy industry, other than as consumers of its products. Support and encouragement of research in the two other areas must come largely from the industry. In our society, product development is the primary responsibility of the industrial organizations which hope to profit from the research. Colleges and universities generally consider that their role in research is the development of fundamental knowledge and its dissemination through teaching. They have made significant contributions in product development, just as industrial laboratories have in basic science. The cost of introducing new products to the market, however, is usually greater than that of development. Thus, to justify introduction costs, some degree of exclusiveness is desired. If patent protection can be secured, exclusiveness can be obtained by licensing. Inability to provide exclusiveness limits the effectiveness of public institutions in product development. Staff members of colleges and universities and of the United States Department of Agriculture often are interested in product development and do work of this type. Rarely, however, is the research carried to a point sufficient to form an adequate basis for commercial production. For an effective research program many of the individual companies must provide staff and facilities capable not only of evaluating and utilizing the research emanating from university and government laboratories, but also that which is more important, generating independent research in the interests of their own organization.

Role of processor. These organizations include the producers of the raw material as well as the processor. The president of a large Midwest dairy is quoted as having said that the primary responsibility of the directors of a business concern was to its stockholders and not to the producers of the raw material processed. The dairy farmer, through the American Dairy Association and to a degree through the agricultural experiment stations, has exerted some leadership in product development. However, this cannot provide the major drive in product development unless the producer also assumes a principal role in processing, through ownership and management of the processing facilities. Actually, today in the butter business the farmer has assumed this role through ownership of most of the butter manufacturing plants. Regardless of ownership, a sufficient profit potential must exist to create an incentive for product development and sale. Much of the creamery industry for years has been on a subsistence basis. The current level of research expenditure in the creamery and, in fact, the entire dairy industry is very low. Some may say that profits are low because of lack of research; others, that there must be profits to support research. Both are right. The industry does not attract risk capital. If capital is secured, I suspect it must come from the industry itself. A conviction on the part of ownership and management of our dairies that profit can be derived from the sale of milk fat products is necessary. Action on this conviction would require investment in research, production facilities, sales and technical sales comparable to that in other successful industries.

Research by most of the producing plants in the creamery industry should not be expected. They are not large enough to have the resources. Larger processing units are evolving, often simply because more milk becomes available, due to the closing of competing plants. Although this process of attrition is painful to those adversely affected by the plant failures, the industry ultimately should benefit through lower operating costs and, hopefully, better management.

Producer assuming role of processor. USDA reports show that in 1964, 71% of the retail price paid for butter was returned to the producer. This compares with 41% for cheese, 54% for beef, 61% for eggs, 12% for white bread, and 28% for margarine. If we are to have new products, money must be spent for research and for product merchandising. This money can come from new capital, from lower production costs, or out of the share received by the producer of the raw material. Savings in production costs in the creamery industry which can be realized by plant consolidation and modernization are considerable, but these changes also require capital. I do not intend to infer that utilization of milk fat is the sole responsibility of the butter industry, but as the recipient of all that is not otherwise used, the butter industry has a primary incentive to profit thereby. In acquiring the dual role of processor, as well as producer, of the raw material, the farmer also assumes the risks of the processor as well as those of the producer.

I believe domestic per person use of milk fat can be stabilized if not increased, but only if the industry assumes the risks normal to good business. Without adequate product research, efficient processing, and aggressive merchandising, continued attrition of the domestic per person use of milk fat may be expected.