

South Dakota State University

Open PRAIRIE: Open Public Research Access Institutional Repository and Information Exchange

Electronic Theses and Dissertations

1956

Consumption and Preference Patterns for Butter and Margarine in Two South Dakota Cities

Norman L. Rollag

Follow this and additional works at: <https://openprairie.sdstate.edu/etd>

Recommended Citation

Rollag, Norman L., "Consumption and Preference Patterns for Butter and Margarine in Two South Dakota Cities" (1956). *Electronic Theses and Dissertations*. 2373.

<https://openprairie.sdstate.edu/etd/2373>

This Thesis - Open Access is brought to you for free and open access by Open PRAIRIE: Open Public Research Access Institutional Repository and Information Exchange. It has been accepted for inclusion in Electronic Theses and Dissertations by an authorized administrator of Open PRAIRIE: Open Public Research Access Institutional Repository and Information Exchange. For more information, please contact michael.biondo@sdstate.edu.

CONSUMPTION AND PREFERENCE PATTERNS FOR BUTTER
AND MARGARINE IN TWO SOUTH DAKOTA CITIES

By

Norman L. Rollag

A thesis submitted
in partial fulfillment of the requirements for the
degree Master of Science at South Dakota
State College of Agriculture
and Mechanic Arts

December, 1956

SOUTH DAKOTA STATE COLLEGE LIBRARY

CONSUMPTION AND PREFERENCE PATTERNS FOR BUTTER
AND MARGARINE IN TWO SOUTH DAKOTA CITIES

This thesis is approved as a creditable, independent investigation by a candidate for the degree, Master of Science, and acceptable as meeting the thesis requirements for this degree; but without implying that the conclusions reached by the candidate are necessarily the conclusions of the major department.

Thesis Advisor _____

/s/ Head of the Major Department _____

ACKNOWLEDGEMENTS

The author wishes to express his appreciation to Dr. R.L. Kristjanson and Dr. Travis W. Manning, thesis advisors, and to L.T. Smythe for their encouragement and guidance throughout the development and completion of this study. The author also wishes to express thanks to Leonard Benning, Canute Johnson and Gerald Marousek for their helpful comments and to Anthony Pavlick for his advice in the statistical analysis of the data.

Acknowledgement is also accorded to Dr. D.F. Breazeale, Dr. R.J. Baker and Shirley Seas of the Dairy Department for their technical assistance in the manufacturing and analysis of the butter and margarine samples used in the consumer panel survey. Credit is also expressed to the members of the consumer panel for their cooperation, and to Miss Lenore Johnston for the typing of this manuscript.

TABLE OF CONTENTS

Chapter	Page
I INTRODUCTION	1
Objectives.	1
Procedure	2
II REVIEW OF LITERATURE	6
Minnesota Study	7
Michigan Study.	8
Recent Consumption Patterns	10
Theory of Supply and Demand	11
III BUTTER GRADING STANDARDS IN THE UNITED STATES.	13
IV SOUTH DAKOTA SURVEY OF CONSUMER PREFERENCE FOR BUTTER.	18
V CONSUMER PANEL SURVEY.	32
VI SUMMARY AND CONCLUSIONS.	46
LITERATURE CITED.	49
APPENDIX A.	50
APPENDIX B.	59
APPENDIX C.	92
APPENDIX D.	109

LIST OF TABLES

Table	Page
I Consumption of Selected Fats and Oils Per Consuming Unit Per Week, by Family Income, Sioux Falls, South Dakota, Summer, 1955	20
II Consumption of Selected Fats and Oils Per Consuming Unit Per Week by Family Income, Brookings, South Dakota, Summer, 1955	21
III Average Consumption of Butter and Margarine According to Annual Income, Sioux Falls, 1955	22
IV Analysis of Variance, Relationship of Income to Butter Consumption.	22
V Analysis of Variance, Relationship of Income to Margarine Consumption.	23
VI Consumption of Butter and Margarine Per Family Per Week, by Family Income, Brookings, South Dakota, Summer, 1955	24
VII Consumption of Butter and Margarine Per Family Per Week, by Family Income, Sioux Falls, South Dakota, Summer, 1955	25
VIII Per Cent of Families by Family Income Using Butter or Margarine Only or Both in Sioux Falls and Brookings, Summer, 1955.	27
IX Preference Intensity for Fats and Oils in Sioux Falls, Summer, 1955	30
X Preference Intensity for Fats and Oils in Brookings, Summer, 1955	31
XI Summary of Relative Preference for Spreads for Use on Hot Breads, Brookings and Sioux Falls, 1955.	34
XII Summary of Relative Preference for Spreads for Use Based on Other Table Uses, Brookings and Sioux Falls, 1955.	35
XIII Summary of Relative Preference for Spreads for Use on Baked Vegetables, Brookings and Sioux Falls, 1955.	36
XIV Summary of Relative Preference for Spreads for Use Based on Seasoning, Brookings and Sioux Falls, 1955	36
XV Summary of Relative Preference for Spreads for Use Based on Frying, Brookings and Sioux Falls, 1955.	37

Table	Page
XVI Summary of Relative Preference for Spreads for Use Based on Baking, Brookings and Sioux Falls, 1955	37
XVII Summary of Relative Preference for Spreads for Use Based on Overall Flavor, Brookings and Sioux Falls, 1955	38
XVIII Summary of Relative Preference for Spreads for Use Based on Saltiness, Brookings and Sioux Falls, 1955.	39
XIX Summary of Relative Preference for Spreads for Use Based on Spreadability, Brookings and Sioux Falls, 1955 (Ranking Basis).	39
XX Summary of Relative Preference for Use Based on Texture, Brookings and Sioux Falls, 1955 (Ranking Basis)	40
XXI Summary of Relative Preference for Spreads for Use Based on Appearance, Brookings and Sioux Falls, 1955	41
XXII Summary of Relative Preference for Spreads for Use Based on Characteristic Flavor, Brookings and Sioux Falls, 1955. . .	42
XXIII Summary of Relative Preference for Use Based on Texture, Brookings and Sioux Falls, 1955 (Non-Ranking Basis)	43
XXIV Summary of Relative Preference for Spreads for Use Based on Spreadability, Brookings and Sioux Falls, 1955 (Non-Ranking Basis).	43
XXV Summary of Relative Preference for Spreads for Use Based on Melting Point, Brookings and Sioux Falls, 1955 (Non-Ranking Basis)	44
XXVI Summary of Relative Preference for Spreads for Use Based on Color, Brookings and Sioux Falls, 1955 (Non-Ranking Basis).	44

Appendix B - List of Tables

Table	Page
I Distribution of Families by Occupation of Head of Household and Butter Consumption Per Family, Brookings, South Dakota, Summer, 1955	60
II Distribution of Families by Occupation of Head of Household and Butter Consumption Per Family, Sioux Falls, South Dakota, Summer, 1955	61
III Distribution of Families by Occupation of Head of Household and Butter Consumption Per Consuming Unit, Brookings, South Dakota, Summer, 1955	62
IV Distribution of Families by Occupation of Head of Household and Butter Consumption Per Consuming Unit, Sioux Falls, South Dakota, Summer, 1955	63
V Distribution of Families by Occupation of Head of Household and Margarine Consumption Per Family, Brookings, South Dakota, Summer, 1955	64
VI Distribution of Families by Occupation of Head of Household and Margarine Consumption Per Family, Sioux Falls, South Dakota, Summer, 1955	65
VII Distribution of Families by Occupation of Head of Household and Margarine Consumption Per Consuming Unit, Brookings, South Dakota, Summer, 1955.	66
VIII Distribution of Families by Occupation of Head of Household and Margarine Consumption Per Consuming Unit, Sioux Falls, South Dakota, Summer, 1955	67
IX Distribution of Families by Family Income and Butter Consumption Per Family, Brookings, South Dakota, Summer, 1955	68
X Distribution of Families by Family Income and Butter Consumption Per Family, Sioux Falls, South Dakota, Summer, 1955. . .	69
XI Distribution of Families by Family Income and Butter Consumption Per Consuming Unit, Brookings, South Dakota, Summer, 1955	70
XII Distribution of Families by Family Income and Butter Consumption Per Consuming Unit, Sioux Falls, South Dakota, Summer, 1955.	71

Table	Page
XIII Distribution of Families by Family Income and Margarine Consumption Per Family, Brookings, South Dakota, Summer, 1955	72
XIV Distribution of Families by Family Income and Margarine Consumption Per Family, Sioux Falls, South Dakota, Summer, 1955	73
XV Distribution of Families by Family Income and Margarine Consumption Per Consuming Unit, Brookings, South Dakota, Summer, 1955	74
XVI Distribution of Families by Family Income and Margarine Consumption Per Consuming Unit, Sioux Falls, South Dakota, Summer, 1955	75
XVII Butter and Margarine Consumption Per Family by Occupation of Head of Household, Brookings, South Dakota, Summer, 1955.	76
XVIII Butter and Margarine Consumption Per Consuming Unit by Occupation of Head of Household, Brookings, South Dakota, Summer, 1955	77
XIX Butter and Margarine Consumption Per Family by Family Income, Brookings, South Dakota, Summer, 1955.	78
XX Butter and Margarine Consumption Per Consuming Unit by Family Income, Brookings, South Dakota, Summer, 1955	79
XXI Butter and Margarine Consumption Per Family by Occupation of Head of Household, Sioux Falls, South Dakota, Summer, 1955	80
XXII Butter and Margarine Consumption Per Consuming Unit by Occupation of Head of Household, Sioux Falls, South Dakota, Summer, 1955	81
XXIII Butter and Margarine Consumption Per Family by Family Income, Sioux Falls, South Dakota, Summer, 1955.	82
XXIV Butter and Margarine Consumption Per Consuming Unit by Family Income, Sioux Falls, South Dakota, Summer, 1955.	83
XXV Number of Families Consuming Selected Fats and Oils Per Week by Family Income, Brookings, South Dakota, Summer, 1955.	84

Table	Page
XXVI Number of Families Consuming Selected Fats and Oils, Per Week by Family Income, Sioux Falls, South Dakota, Summer, 1955	85
XXVII Total Consumption of Selected Fats and Oils Per Week by Family Income, Brookings, South Dakota, Summer, 1955 . . .	86
XXVIII Total Consumption of Selected Fats and Oils Per Week by Family Income, Sioux Falls, South Dakota, Summer, 1955 . .	87
XXIX Number of Consuming Units in Families Using Selected Fats and Oils by Family Income, Brookings, South Dakota, Summer, 1955	88
XXX Number of Consuming Units in Families Using Selected Fats and Oils by Family Income, Sioux Falls, South Dakota, Summer, 1955	89
XXXI Consumption of Selected Fats and Oils Per Family Per Week by Family Income, Brookings, South Dakota, Summer, 1955. .	90
XXXII Consumption of Selected Fats and Oils Per Family Per Week by Family Income, Sioux Falls, South Dakota, Summer, 1955.	91

Appendix C - List of Tables

Table	Page
I Comparative Preference of Spreads in Paired Combinations, Brookings and Sioux Falls, 1955, Factor, Hot Breads	93
II Comparative Preference of Spreads in Paired Combinations, Brookings and Sioux Falls, 1955, Factor, Other Table Uses	94
III Comparative Preference of Spreads in Paired Combinations, Brookings and Sioux Falls, 1955, Factor, Baked Vegetables	95
IV Comparative Preference of Spreads in Paired Combinations, Brookings and Sioux Falls, 1955, Factor, Seasoning	96
V Comparative Preference of Spreads in Paired Combinations, Brookings and Sioux Falls, 1955, Factor, Frying	97
VI Comparative Preference of Spreads in Paired Combinations, Brookings and Sioux Falls, 1955, Factor, Baking	98
VII Comparative Preference of Spreads in Paired Combinations, Brookings and Sioux Falls, 1955, Factor, Overall Flavor	99
VIII Comparative Preference of Spreads in Paired Combinations, Brookings and Sioux Falls, 1955, Factor, Saltiness.	100
IX Comparative Preference of Spreads in Paired Combinations, Brookings and Sioux Falls, 1955, Factor, Spreadability.	101
X Comparative Preference of Spreads in Paired Combinations, Brookings and Sioux Falls, 1955, Factor, Texture.	102
XI Comparative Preference of Spreads in Paired Combinations, Brookings and Sioux Falls, 1955, Factor, Appearance	103
XII Comparative Preference of Spreads in Paired Combinations, Brookings and Sioux Falls, 1955, Factor, Characteristic Flavor.	104
XIII Comparative Preference of Spreads in Paired Combinations, Brookings and Sioux Falls, 1955, Factor, Characteristic Texture	105
XIV Comparative Preference of Spreads in Paired Combinations, Brookings and Sioux Falls, 1955, Factor, Characteristic Spreadability	106

Table

Page

XV	Comparative Preference of Spreads in Paired Combinations, Brookings and Sioux Falls, 1955, Factor, Characteristic Melting Point	107
XVI	Comparative Preference of Spreads in Paired Combinations, Brookings and Sioux Falls, 1955, Factor, Characteristic Color	108

LIST OF FIGURES

Figure	Page
I Butter and Margarine, Retail Prices and Consumption Per Person . .	6

CHAPTER I

INTRODUCTION

Most of the butter manufactured by South Dakota creameries is Grade B or under as determined by our present Federal grading system. A recent South Dakota study showed that 81 per cent of the butter was Grade B and 19 per cent Grade C. The same study found that about 80 per cent of South Dakota Butter was shipped to markets where a large amount of the other butter was of a higher grade and premiums were paid for higher quality. ¹

Present quality standards for butter are based to a large extent on taste preferences of consumers which were assumed to exist a number of years ago. This study endeavored to gather additional evidence regarding consumer preferences for various flavors, texture and color qualities found in butter and the other fats and oils. This study also attempted to determine what influences personal characteristics (such as occupation, annual family income, or factors associated with place of birth, national origin, rural or urban background, religious preferences, and age of respondent) had upon consumption of various spreads, especially butter and margarine.

Objectives

The major objectives of this study were: (1) to determine

¹ D.F. Breazeale and Ernest Feder, "How Marketing and Processing Methods Affect Butter Quality." South Dakota Farm and Home Research, Agricultural Experiment Station, Agriculture Economics and Dairy Department, South Dakota State College, Winter, 1952, Vol. III, No. 2, pages 25-29.

present and past consumption patterns of fats and oils used in the survey homes, (2) to determine the range and intensity of consumer preferences for butter and other spreads, and (3) to determine whether taste preferences of consumers coincided with the present Federal grading system for graded butter.

Procedure

The study of consumer preferences for grades of butter and margarine was divided into two major phases. A preliminary survey was made in the summer of 1955. This survey was designed to obtain information relevant to the effect of so-called "influential" factors on butter and substitute fats consumption. These influential factors, including place of birth, national origin, occupation, rural or urban background, religious preferences, and annual family income, were needed to stratify properly the consumer panel.

This preliminary survey was composed of 322 families in Sioux Falls and 50 families in Brookings. Telephone directories and personal property tax lists were used as sources for the samples. Every fiftieth name was used after random selection of the first name had been made from the lists. Business listings were eliminated before the samples were drawn.

Data were collected on total weekly consumption of butter, margarine, and other fats and oils such as lard, vegetable shortening, cooking oils, and salad dressings. This survey gave insight into uses being made of fats and oils in baking, frying, vegetables, salads, and other uses. Respondents were asked for their preferences in butter and margarine based on such important characteristics

as taste, appearance, spreadability, keeping qualities, nutrition, and dieting. The consumer gave a "definite," "weak," or "no" preference rating for each of the essential characteristics listed.

The initial questionnaire also included information regarding age of family members, meals eaten out per week, and number of consuming units. The respondent also stated whether his family would be willing to participate in a consumer panel if selected.

This consumer panel survey was made during the last three months of 1955 to determine whether present grading standards reflect preferences of consumers. The stratified random sample was composed of forty families selected from the preliminary survey.

Thirty Sioux Falls families and ten Brookings families were selected for the consumer panel. The families were stratified according to annual family income. The income levels were grouped as follows: "low" income group included families with less than \$4,000 annual income, "medium" included families with an annual income of \$4,000-6,999, and "high" income families with an income of \$7,000 or more.

Each panel member received a questionnaire which was coded by group, family, week number, preliminary survey number and also included date questionnaire was completed. The panel members were asked to compare and rank four sample grades of butter and a sample of margarine in random selected pairs weekly for a ten week period. The four coded samples of butter used were as follows: Grade A

with culture, Grade A without culture, Grade B and Grade C, and one non-graded sample of margarine.²

Two adults, usually husband and wife, were requested to rank the two half-pound samples of butter and margarine, these samples being identified by code numbers.

The numbers were written on all samples prior to delivery to the panel members. The adult panel members indicated the intensity of their preference in columns headed "slight," "definite" or "neither."

Every family received the five samples of butter or margarine in all possible paired combinations over the ten-week period. The questionnaires were picked up at the end of each week when the families received another two samples of butter or margarine. On this questionnaire, the respondents ranked the two spreads for some of the common uses and characteristics of butter and margarine such as: hot breads, other table uses, baked vegetables, seasoning, frying, baking, overall flavor, saltiness, spreadability, texture, and appearance. Respondents were requested to point out characteristic flavors of the five samples they "liked" or "disliked." The respondents also gave their preference for these qualities: texture, spreadability, melting point, and color of the two spreads on a non-ranking basis.

² The butter was scored by a Federal butter grader as follows:
 Grade A with culture - 92 1/2 score
 Grade A without culture - 93
 Grade B without culture - 91
 Grade C without culture - 89

A major portion of answers received from the consumer panel survey were coded and placed on IBM cards for scoring important factors. All of these factors were tabulated and analyzed for their importance and influence in the survey of butter and substitute fats consumption,

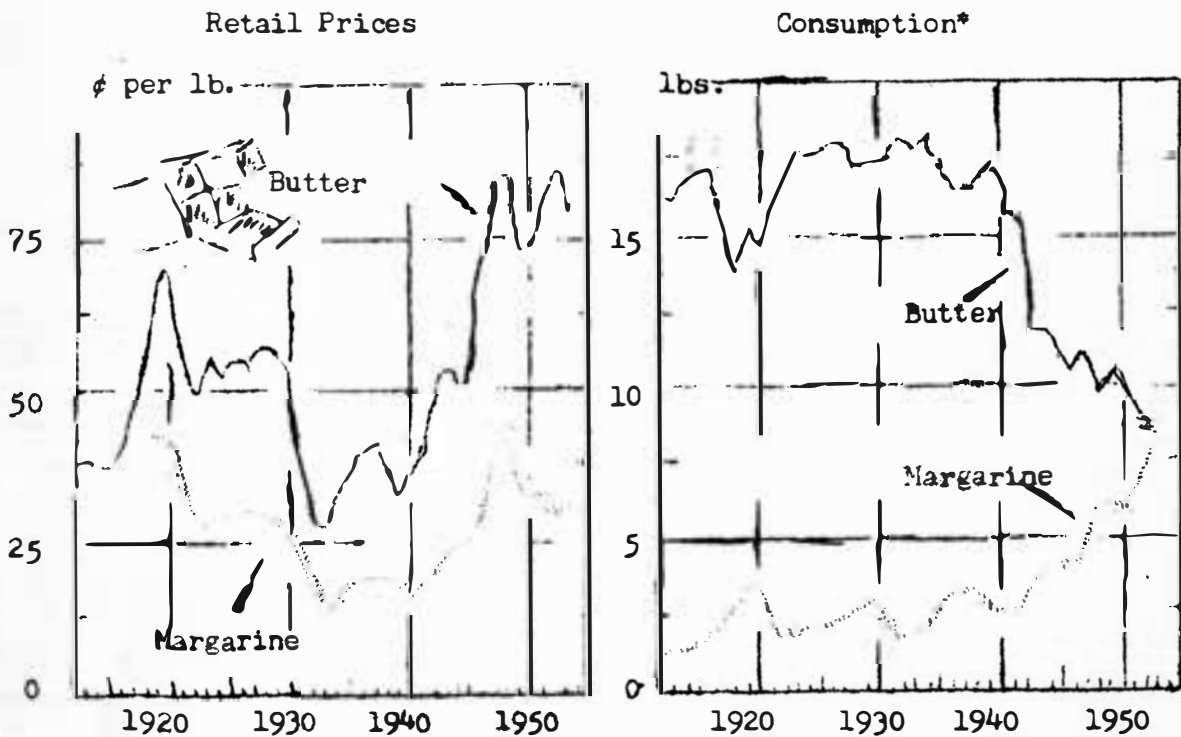
All the butter samples for the ten-week period were manufactured by the Dairy Department of South Dakota State College under controlled conditions. The margarine was purchased on a special order and received from a local warehouse. The samples were manufactured, packaged, and labeled at the beginning of the study for the entire ten-week period and stored under refrigeration. This survey was a combined project of the Dairy and Agricultural Economics Departments of South Dakota State College.

CHAPTER II

REVIEW OF LITERATURE

The demand for butter and margarine has followed a rather definite trend of consumption the past two decades. This noted trend has been greatly influenced by a comparatively wide price differential between butter and margarine. The consistently higher retail price of butter has tended to cause butter consumption to decrease while there has been an increase in the consumption of

BUTTER AND MARGARINE



U.S.D.A.

Figure 1 ³

* Per Person Per Year

³ Milk and Its Products, AIB Number 125, United States Department of Agriculture, Washington, D. C., May 1954, pages 2,3.

margarine as shown in Figure 1 of retail prices and per capita consumption of these food products for several decades.⁴

The price differential between butter and margarine has been especially evident during the past ten years. Per capita consumption of butter and margarine has been nearly equal the past four years.

Studies have been made relating to consumption of butter, margarine and other fats and oils commonly used in the home. Several of these studies have attempted to determine the importance of such supposedly "influential" factors as income, nationality, price differential, size of family, education, and age of homemakers on consumption of all fats and oils. Two recent studies were made in Minnesota and Michigan relating to butter and substitute fats consumption.

Minnesota Study

The 1952 Minnesota study indicated that more than one-third of the families used margarine, although butter was the dominant spread consumed. The total consumption of butter was greater than any of the other fats followed by vegetable shortening, margarine, dressings, and spreads. The Minnesota survey revealed that table use accounted for four-fifths of the butter consumed and three-fifths of the margarine consumed.⁵

⁴ Milk and Its Products, AIB Number 125, United States Department of Agriculture, Washington, D.C., May 1954, pages 2,3.

⁵ Rex W. Cox, Competition Between Butter and Margarine, Minneapolis, 1952, Station Bulletin 417, Agricultural Experiment Station, University of Minnesota, June 1953, pages 4, 5, 7.

When either or both spreads were used in the home, approximately 60 per cent of the families used butter alone, 10 per cent consumed only margarine, and 30 per cent consumed some of each of these spreads. However, total consumption of butter and margarine was about equal when both spreads were used in the home. This pattern of consumption was also true on a per consuming unit basis. About one-half of the families consuming butter used .6 of a pound per consuming unit each week. Approximately four-fifths of the families consuming margarine used less than .4 pounds per consuming unit weekly.

This study also indicated that income, nationality, and size of family influenced consumption of butter and margarine the greatest with family income considered the most important of all. Total fat consumption was nearly the same for all income levels. Consumption of butter increased and margarine decreased as family income increased. The family income determined more whether butter or margarine was used rather than total amount consumed. Butter consumption exceeded the use of margarine at every income level.

The price of butter was considered the most important factor influencing the present trend toward increased consumption of margarine. Another factor influencing the present trend was the price difference between butter and margarine.

Michigan Study

The Michigan study of consumer purchases of butter and margarine gave some pointed reasons for the recent trend in consumption of these products. The two year weekly survey starting in July, 1951

indicates about a five percent yearly decrease in butter consumption while margarine consumption was increasing at nearly the same rate. However, this consumer panel survey showed that more families used margarine than butter. Eighty-three per cent of the Michigan families believed that butter tasted better than margarine while half of those using margarine believed butter had more food value.⁶

Surveys made of Michigan families in 1949 and 1954 showed marked differences of opinion. Eighty percent of those families not using butter in 1949 felt it was too expensive, while there were 59 per cent giving the same reason in 1954. Eleven per cent of the families included in the 1949 survey indicated no preference for butter over margarine; the 1954 survey showed that one-third of the families stated no preference. Taste was the main reason for using butter rather than margarine.

When either or both spreads were consumed, 59 per cent of the families used only butter, 20 per cent used only margarine and the remaining 21 per cent used both spreads. The 1954 survey showed a downward trend in consumption for families using butter only with 38 per cent consuming butter alone, 29 per cent using margarine alone, and 31 per cent using both butter and margarine.

This study showed a great deal of variation in consumption of butter and margarine in the home with the factors of income, size of

⁶ J.D. Shaffer and G.G. Quackenbush, Consumer Purchases of Butter and Margarine, Technical Bulletin 248, Agricultural Experiment Station, Department of Agricultural Economics, Michigan State College, East Lansing, April, 1955, page 4.

family, education, and age of housewife explaining only a small part of the variation. The per capita income was most highly related to consumption of all the factors checked.

High prices had an important effect on purchases of butter and margarine with the average annual expenditure per person for butter and margarine totaling \$9.52 of which \$7.09 was spent for butter. The lowering of the governmental support levels has resulted in a decline of as much as ten cents in the retail price of butter according to the Michigan State study.

Recent Consumption Patterns

Families in the upper income groups reported a larger per capita purchase of butter than margarine while the lower income groups used more margarine for the months of April-September, 1955, as reported by Agricultural Marketing Service of the U.S.D.A. Other family characteristics in 1955 showed greater consumption of butter among families headed by professional and executive workers, households with children of school age, housewives who are over 45 years old, and families with less than three members. Margarine made the largest gain in the homes of farmers, children in multiple age groups, large size families, and housewives under 45. There was no definite trend between butter and margarine purchases relating to occupational or educational background.⁷

⁷ Household Purchases of Butter, Margarine, Cheese, Non-Fat Dry Milk Solids, by Family Characteristics, April--September, 1955, Agricultural Marketing Service, U.S.D.A., HPD-20, March, 1956, page 5.

Theory of Supply and Demand

Historically, the demand for butter has been assumed to be elastic, meaning that a small change in price will result in a definite and more than proportionate change in the quantity sold or demanded. A price analysis for a two year period in the Michigan study tended to refute this assumption when it indicated that there was an inelastic demand for butter. This study showed that an estimated one per cent change in price of butter would result in 0.5 per cent change in consumption of butter in the opposite direction. A one per cent change in margarine resulted in a 0.5 per cent change in the consumption of butter, but in the same direction. This condition may have been influenced by a high disposable income and high wages during a post-war boom period, especially in a state with a high percentage of industrial workers such as Michigan.⁸

The elasticity of demand for a product, such as butter, is dependent primarily on the consumer's ability to obtain an adequate substitute such as margarine. Normally, if there is a suitable substitute available, a rise in price will direct expenditures from the original commodity to the substitute. If price falls, the opposite condition will take place with a rise in demand for the original commodity and a decline in demand for the substitute.⁹

⁸ Shaffer and Quackenbush, op. cit., page 6.

⁹ Kenneth F. Boulding, Economic Analysis, Harper and Brothers Publishers, New York, Revised Edition, 1948, page 133.

There are several important cultural factors which are influencing consumption of all fats and oils including butter. One of the most important factors is that the present American public is consuming less fat in their diet. Because of the great emphasis being directed toward use of less fat, butter has lost some of its previous importance. Also, consumers today are much more conscious of their eating habits because of medical reports, research findings, and various other factors.

CHAPTER III

BUTTER GRADING STANDARDS IN THE UNITED STATES

On October 1, 1918, the Congress of the United States authorized the U.S.D.A. to establish a Federal inspection and grading service enabling buttermakers and dealers to have a Government inspector examine commercial lots of butter and issue certificates of grades. Federal butter grading has always been conducted on a voluntary basis. Any manufacturer or dealer may have his butter federally graded to facilitate doing business with customers in near and distant markets who want assurance they are getting the quality of product for which they paid a certain price. Numerous manufacturers and dealers who pack for the retail trade and similar businesses want to give assurance to their customers that their butter has been certified as to quality by a government grader.¹⁰

A series of well-orientated steps must be taken by a Federal grader in determining the grade of butter. The freshly churned butter is packed in a bulk container for shipment to central marketing centers. The Federal grader normally does his work at packaging plants where his highly trained sense of taste and smell determine the grade. The grading is carried on under ideal conditions, when possible, with a minimum of distracting odor.

The key factor in butter grading is the quality of flavor of the butter sample which is determined largely on the basis of

¹⁰ Know Your Butter Grades, United States Department of Agriculture, Leaflet No. 264, Revised, Washington, D.C., February 1956, page 1.

taste and smell. Other factors which also influence grade are body, color, and salt content. The grader must designate a grade for the entire churning of butter. Some of the identifiable flavors which reduce the quality, thus the grade and score designation, are: feed, cooked, aged, bitter, coarse acid, flat, storage, musty, waxy, and sour.

Many questions have arisen as to whether the various grades of butter correspond to consumer demand for these grades. Because of this, there have been debates regarding the feasibility of changing the Federal grading system.

A general definition for butter according to the United States Department of Agriculture is: "Butter is the food product made from milk or cream, or both, with or without common salt or additional coloring matter, and containing not less than 80 per cent by weight of milk fat, all tolerance having been allowed for." The nomenclature of U.S. grades is as follows: (1) U.S. Grade AA or U.S. 93 score; (2) U.S. Grade A or U.S. 92 score; (3) U.S. Grade B or U.S. 90 score; and (4) U.S. Grade C or U.S. 89 score."¹¹

The specifications of butter grades for the state of South Dakota coincide very closely with the standard requirements set up by the United States Department of Agriculture. The requirements are based on definite characteristics for each of the four grades. These specific requirements explained in the following grades are:

¹¹ Ibid., page 1.

1. Grade AA or 93 score -- The highest commercial grade of butter. This grade has a highly pleasing flavor, a smooth creamy texture and is slightly waxy, which allows the butter to spread readily without crumbling. Grade AA butter is made from fresh sweet cream. The only flavors permitted in this top grade butter are a slight feed and cooked flavors.

2. Grade A or 92 score -- Grade A butter has a pleasing and desirable flavor. It is made from sweet cream or cream with a slight degree of sourness. For those who prefer a fresh mild flavor, Grade A is a very close second to Grade AA.

3. Grade B or 90 score -- This grade of butter is normally made from farm separated cream. Grade B is wholesome and palatable, but lacks some of the characteristic fine sweet flavor of the two top grades. The various flavors permitted in this grade are those usually associated with sour cream.

4. Undergrade butter or 89 score -- This butter is labeled undergrade, normally made from old sour cream. It is nutritious butter, but generally contains undesirable flavors.¹²

The reason for developing a system of grade labeling has been a desire to improve the quality of cream. Many states, such as Wisconsin, have developed their own grade-labeling system. Laws such as the Wisconsin legislature passed make it unlawful to sell or expose for sale, have possession with the intent to sell, any

¹² Leonard Benning and Shirley Seas, Know Your Grades of Butter, Extension Circular 530, South Dakota State College, November 1955, page 3.

butter at retail unless graded.¹³

Several studies have been made and articles written suggesting the advantages of consumer grade labeling which means placing the correct grade on each pound of butter. In a study of consumer grade labeling of butter made by the Marketing Association of America, ten major points for improvement were suggested in a state grade labeling law. This was considered as the first major "self-help" program in the butter industry in two decades.¹⁴

The emphasis placed on consumer preference has as its basic intent to get "bad butter" off the market. Butter of poor quality has damaged consumer acceptance, turned it directly to other spreads and thus reduced the per capita consumption of butter in recent years. There must be a sound grading system plus the use of advanced consumer education policies to create a demand for higher quality butter as well as quality consciousness among consumers.

Suggestions have been made that the butter industry should develop "brand name labeling." Only one out of sixteen pounds of butter being marketed is graded with a brand name under officially designated standards. There has been a contention by some producers and inspectors that butter cannot be graded at one point with the assurance that it will retain a fine flavor quality. The use of

¹³ H.J. Weavers, "Grade Labeling of Butter in Wisconsin," The Milk Products Journal, An Olsen Publication, Milwaukee, Wisconsin, January 1956, page 20.

¹⁴ Edwin A. Oiermark, "A Study and Analysis of Consumer Grade Labeling," American Milk Review, An Urner-Barry Publication, New York, March, 1956, page 48.

"brand labeling" was a suggested alternative, wherein each organization promotes the use of its brands and distributes and/or advertises that brand with careful control of quality standards.

The importance of developing in consumers a realization of quality is a slow educational process. People have become very conscious of grading systems which have been developed in many food products, such as the well-known system of grading meat. This same conscious awareness of variation among butter grades should be emphasized to the butter consumer. Consumers need to be better informed of the value of knowing the difference between grades of butter. When they see the letters "U.S." designation on the carton or wrapper, they know the butter has been graded by an authorized grader of the U.S.D.A. This means the consumers are obtaining the quality they wanted which corresponded to the price they were willing to pay.

Consumers have a right to know what grades of butter they are buying. Some of the essential factors about which consumers need additional knowledge and a better understanding are: determination of grades, classification of flavor, rating the defects in body, color, salt and relation of grade to flavor classification.

The reliability of grade as an index of consumer preference has been a basis of controversy in explaining recent butter consumption patterns. Assumptions have been made by producers and consumers alike that grades do not correspond with consumer preference. Much of the present basis for consumer preference of butter has been a gradual selection process influenced by many social and economic conditions.

CHAPTER IV

SOUTH DAKOTA SURVEY OF CONSUMER PREFERENCES FOR BUTTER

The preliminary survey was designed to gather usable information which would be helpful in the selection of a representative consumer panel. The questionnaire furnished information relating to: personal data, family characteristics, financial status, weekly fats and oil consumption, preference intensity for characteristics and uses of fats and oils, and willingness to participate in the consumer panel. These facts were used in the selection of the 10 Brookings families and 30 Sioux Falls families to constitute a representative consumer panel.

Weekly consumption is normally stated in pounds per family or pounds per consuming unit. A consuming unit is an adult male equivalent eating all of his meals at home each week. The consumer unit equivalents for various members of the family are:

	<u>Consuming Unit</u>
Adult Male - - - - -	1.0
Adult Female - - - - -	.8
Children - - - - -	
Boy, 13 years or older - - - - -	1.0
Girl, 13 years or older - - - - -	.9
10 - 12 years old - - - - -	.7
7 - 9 years old - - - - -	.3
9 months to 3 years old - - - - -	.1
Under 9 months - - - - -	.0

If a family member eats some of his meals away from home each week, the consuming unit equivalent assigned to that individual is adjusted to reflect this situation.

One part of the study was directed toward finding just how consumers having different characteristics varied in their consumption of butter and fat substitutes. Competition between butter and margarine, is, in part, the competition among all edible fats and oils; thus, consideration was given to the consumption of lard, vegetable shortenings, sandwich spreads, and other fats and oils commonly used in the home.

Tables I and II show the weekly consumption of fats and oils. These tables, based on weekly consumption per consuming unit for each \$1,000 income level, give proper perspective in comparing the trends of consumption for butter and fat substitutes. These tables show that the amount of butter and margarine used per family did not steadily increase as income increases. Observation of data on other fats and oils shows a similar pattern of consumption. The data as shown in Tables I-XVI and XXV-XXXII of Appendix B give additional figures regarding total consumption, average weekly consumption, and distribution of families for selected fats and oils. Neither occupational nor income classifications showed a definite pattern of consumption for the various fats and oils.

There appeared to be a positive relationship between income and margarine consumption in Sioux Falls (Table I). The data were grouped according to the "low," "medium," and "high" income level designations explained in the introductory chapter.

Table I. Consumption of Selected Fats and Oils Per Consuming Unit Per Week by Family Income, Sioux Falls, South Dakota, Summer, 1955

Annual Family income	Type of Fat or Oil Consumed						
	Butter	Margarine	Lard	Vegetable Shortening	Cooking oils	Sandwich spreads	Salad dressings
	(pounds per consuming unit per week)						
less than \$2,000	.72	.47	.46	.45	.17	.22	.24
2,000 - 2,999	.65	.52	.27	.36	.24	.16	.26
3,000 - 3,999	.56	.52	.25	.38	.21	.21	.25
4,000 - 4,999	.68	.57	.32	.39	.12	.22	.28
5,000 - 5,999	.67	.47	.29	.44	.11	.19	.25
6,000 - 6,999	.69	.54	.49	.35	.07	.22	.21
7,000 - 7,999	.67	.70	.34	.29	.17	.28	.24
8,000 - 8,999	.68	.26	.0	.37	.18	.20	.21
9,000 - 9,999	.77	.0	.07	.32	.05	.26	.22
10,000 - over	.69	.81	.15	.30	.16	.13	.14
Unknown	.62	.47	.29	.41	.12	.20	.28
All families - average	.65	.53	.30	.39	.15	.21	.25

Table II. Consumption of Selected Fats and Oils Per Consuming Unit Per Week by Family Income, Brookings, South Dakota, Summer, 1955

Annual Family income	Type of Fat or Oil Consumed						
	Butter	Margarine	Lard	Vegetable Shortening	Cooking oils	Sandwich spreads	Salad dressings
(pounds per consuming unit per week)							
Less than \$2,000	.95	1.31	.0	.49	.0	.36	.0
2,000 - 2,999	.53	.65	.43	.25	.0	.16	.16
3,000 - 3,999	.78	.46	.33	.38	.39	.18	.19
4,000 - 4,999	.75	.66	.28	.34	.19	.17	.24
5,000 - 5,999	.64	.46	.31	.55	.07	.19	.15
6,000 - 6,999	1.29	.0	.0	.81	.0	.81	.39
7,000 - 7,999	.23	.45	.11	.11	.11	.0	.05
Unknown	.65	.0	.28	.19	.11	.31	.11
All families-average	.74	.60	.29	.37	.20	.22	.20

The average consumption of butter and margarine shows some variation (Table III). Consumption of butter was higher for the low and high income groups than for the medium income groups. The consumption of margarine moved slowly downward as income increased in the Sioux Falls sample.

Table III. Average Consumption of Butter and Margarine According to Annual Income, Sioux Falls, 1955

Family Income	Butter	Margarine
\$ 0 - 3,999	.48	.30
\$4,000 - 6,999	.34	.29
\$7,000 - over	.48	.26

The relationship of income to butter consumption was significant at the five per cent level, but not at the one per cent level (Table I). The statistical technique of variance analysis was used in the Sioux Falls sample as shown in Table IV.

Table IV. Analysis of Variance, Relationship of Income to Butter Consumption

Sources of Variation	Sum of Squares	Degrees of Freedom	Est. of Variance	F Ratio*
Among classes	1.21	2	.61	3.18
Within classes	134.55	699.45	.192	*F.95 (2, 699) = 3.00
Total	135.76			

Although there appeared to be a negative relationship between income and margarine consumption in the Sioux Falls survey (Table I),

statistical analysis failed to show that the differences were significant. A survey of this analysis is shown in Table V.

Table V. Analysis of Variance, Relationship of Income to Margarine Consumption

Sources of Variation	Sum of Squares	Degrees of Freedom	Est. of Variance	F Ratio*
Among classes	.11	2	.06	.43
Within classes	102.56	699	.14	*F 95 (2.00) = 3.00
Total	102.67			

No statistical relationship could be seen in the other consumption data and consequently no statistical analyses of these data were made.

Using consuming units as a basis of comparison showed that more butter was used than any other fat or oil consumed, followed by margarine, vegetable shortenings, and lard. There was little variation in the consumption of salad dressings, sandwich spreads, and cooking oils between the two populations studied. The indicated pattern of decreased lard consumption with vegetable shortenings replacing it very rapidly was shown in this study. (Tables I and II.)

A summary of total consumption per family for butter and margarine was made (Tables VI and VII). Consumption of butter was greater on a total consumption as well as weekly consumption basis. Total consumption of butter was larger than margarine at every level of income for Sioux Falls and with one exception in Brookings. The

Table VI. Consumption of Butter and Margarine Per Family Per Week by Family Income, Brookings, South Dakota, Summer, 1955

Annual Family income	Total Consumption (pounds)	Butter		Total consumption (pounds)	Margarine	
		No. of families	Consumption per family per week		No. of families	Consumption per family per week
Less than \$2,000	7.50	5	1.50	8.00	3	2.67
2,000 - 2,999	2.50	3	.83	1.50	2	.75
3,000 - 3,999	18.00	9	2.00	12.00	10	1.20
4,000 - 4,999	21.00	12	1.75	9.60	7	1.37
5,000 - 5,999	5.00	4	1.25	2.75	3	.92
6,000 - 6,999	4.00	2	2.00	.00	0	.00
7,000 - 7,999	1.00	1	1.00	2.00	1	2.00
Unknown	3.50	3	1.17	.00	0	.00
Total	62.50	39		35.85	26	
Average			1.60			1.38

Table VII. Consumption of Butter and Margarine Per Family Per Week, by Family Income, Sioux Falls, South Dakota, Summer, 1955

Annual Family income	Total Consumption (pounds)	Butter		Margarine		
		No. of families	Consumption per family per week	Total Consumption (pounds)	No. of families	Consumption per family per week
Less than \$2,000	17.50	20	.88	8.25	12	.69
2,000 - 2,999	16.75	14	1.20	10.83	12	.90
3,000 - 3,999	45.75	36	1.27	42.75	34	1.26
4,000 - 4,999	90.00	62	1.45	57.75	44	1.31
5,000 - 5,999	62.83	41	1.53	33.70	29	1.16
6,000 - 6,999	15.50	11	1.41	9.25	9	1.03
7,000 - 7,999	19.50	12	1.63	11.50	8	1.44
8,000 - 8,999	5.75	4	1.44	1.00	1	1.00
9,000 - 9,999	6.00	3	2.00	.0	0	.0
10,000 - over	14.00	8	1.75	10.00	5	2.00
Unknown	51.75	38	1.36	18.75	16	1.17
Total	345.33	249		203.78	170	
Average			1.39			1.20

largest quantity of butter and margarine was consumed by families earning \$4,000 to \$4,999 annually, since this was the largest single income group. There was less margarine than butter used on the average for all the families combined in both cities.

Distribution of butter and margarine consumption according to families shows some rather definite patterns (Appendix B, Tables I-XVI). The largest number of families use from 1.00-1.99 pounds of butter each week. This consumption pattern is also true for those families using margarine. There was a larger group of families using no margarine compared with families using no butter.

Of the families consuming less than one pound of butter and margarine weekly, more were using margarine than butter. When one pound or more was consumed per week, butter was used by more families than was margarine. This indicates that when the total consumption of butter and margarine is small the percentage of margarine consumed is larger than for butter; conversely, when the consumption is large, the proportion of butter consumed was greater than that of margarine.

No consistent or definite pattern of weekly consumption of butter and margarine was found according to occupational or income status of the persons surveyed.

The percentages of families using butter only, margarine only, or using both butter and margarine in their homes is shown in Table VIII. A higher percentage of families were using butter alone as compared to margarine alone in the home. Nearly one-third of the families used various combinations of butter and margarine together.

Table VIII. Percent of Families by Family Income Using Butter or Margarine Only or Both in Sioux Falls and Brookings, Summer, 1955

Annual Family income	Total	<u>Proportion of families consuming</u>				Total	<u>Proportion of families consuming</u>			
		B.O.	M.O.	B & M	Neither		B.O.	M.O.	B & M	Neither
		(per cent)					(per cent)			
Less than \$2,000	100.0	53.8	23.1	23.1	0.0	100.0	40.0	0.0	60.0	0.0
2,000 - 2,999	100.0	36.8	26.3	36.8	0.0	100.0	60.0	40.0	0.0	0.0
3,000 - 3,999	100.0	32.0	28.0	40.0	0.0	100.0	24.0	30.8	46.2	0.0
4,000 - 4,999	100.0	43.6	20.5	35.9	0.0	100.0	56.3	25.0	18.8	0.0
5,000 - 5,999	100.0	44.2	21.2	34.6	0.0	100.0	25.0	0.0	75.0	0.0
6,000 - 6,999	100.0	47.1	35.3	17.6	0.0	100.0	100.0	0.0	0.0	0.0
7,000 - 7,999	100.0	55.6	33.3	11.1	0.0	100.0	0.0	0.0	100.0	0.0
8,000 - 8,999	100.0	75.0	0.0	25.0	0.0					
9,000 - 9,999	100.0	100.0	0.0	0.0	0.0					
10,000 - over	100.0	50.0	20.0	30.0	0.0					
Unknown	100.0	64.4	15.6	20.0	0.0	100.0	75.0	0.0	0.0	25.0
Total	100.0	47.2	22.7	30.1	0.0	100.0	46.0	20.0	32.0	2.0

About 22 per cent of the families consumed no butter, while 48 per cent of the Brookings families and 46 per cent of the Sioux Falls families used no margarine in their homes.

The various occupational and income classifications showed no conclusive evidence of relationship to consumption for the two spreads. However, when both spreads were used every week, there was a consistent pattern of more butter being used in the home. (Appendix B, Tables VII-XXIV.)

A summation is made of the last portion of the questionnaire regarding preference intensity for characteristics and common uses of butter and margarine (Tables IX and X). Preference intensity for lard, vegetable shortenings and cooking oils for baking and frying was included in the survey also.

There were several classifications in which a definite preference was shown for butter as compared with margarine. This indicated preference was shown for toast and hot breads, seasoning and taste and to a lesser degree for the factors of nutrition, other table uses, and sandwiches. A preference for margarine over butter because of price was expressed by 79 persons in response to an open question. The data shows that there was a definite belief in the nutritional superiority of butter over margarine. A definite preference for shortening was noted when used for frying purposes as compared with either butter or margarine.

An analysis was made of the possible influence of place of birth, national origin, size of family and rural or urban background

upon consumption patterns. None of these factors showed any definite relationship to consumption. These factors showed less relation to consumption than did occupation and income.

Table IX. Preference Intensity for Fats and Oils in Sioux Falls, Summer, 1955

Sioux Falls	<u>Butter</u>		<u>Margarine</u>		Neither	Blanks and Do not know
	Definite Preference	Weak Preference	Definite Preference	Weak Preference		
Taste	217	32	14	11	46	9
Appearance	88	38	8	11	138	23
Spreadability	85	48	34	53	71	34
Keeping Quality	46	19	58	62	58	78
Nutrition	155	38	4	6	64	61
Dieting	37	24	21	41	84	115
Toast & Hot breads	251	12	14	10	24	13
Other table uses	175	36	25	20	53	16
Sandwiches	170	33	25	22	60	11
Seasoning	240	20	18	16	9	13
Price			79	4		
Baking	105	13	24	20	9	10
Frying	73	10	12	18	8	18
		<u>Lard</u>		<u>Shortening</u>		<u>Oils</u>
	Definite	Weak	Definite	Weak	Definite	Weak
Baking	13	4	90	53	1	0
Frying	26	12	90	51	12	0

Table X. Preference Intensity for Fats and Oils in Brookings, Summer, 1955

Brookings	<u>Butter</u>		<u>Margarine</u>		No Preference	Blanks and Do not know
	Definite Preference	Weak Preference	Definite Preference	Weak Preference		
Taste	37	1		2	5	3
Appearance	15	8	1	2	20	2
Spreadability	13	8	5	9	8	5
Keeping Quality	9	4	10	7	13	5
Nutrition	26	5	0	1	11	5
DiETING	10	4	4	8	12	10
Toast & Hot breads	40	1	1	0	4	2
Other table uses	15	10	5	6	9	3
Sandwiches	15	10	6	6	8	3
Seasoning	32	4	6	1		5
Price			23			5
Baking	10	1	8	0		
Frying	9	5	3	1		
	<u>Lard</u>		<u>Shortening</u>		<u>Oils</u>	
	Definite	Weak	Definite	Weak	Definite	Weak
Baking	3	1	22	3	1	
Frying	7		23			1

CHAPTER V

CONSUMER PANEL SURVEY

The question has arisen whether the federal system for butter grading agrees with the preferences of the present-day consumer. The consumer panel study, composed of 40 families, was directed toward giving further insight into this question.

The ten possible combinations of the four butter samples and one margarine sample were used to determine a relative ranking for various important characteristics and uses of these spreads in the home. Nearly 800 questionnaires were returned by the consumer panel during the ten week period. These results were placed on IBM cards for sorting and tabulation of the factors checked. No statistical analysis was made because a taste preference has no definable measurement.

The respondents were asked to indicate which spread they preferred and their intensity of preference with a check mark in the proper columns designated "slight," "definite," or "neither." The scoring of these questionnaires was as follows when comparing the two spreads: five points for the spread having a definite preference and one point for the other spread; four points for the spread having a slight preference and two points for the other spread; and three points for both spreads when the respondent preferred "neither."

The consumer panel questionnaire included two other parts. The respondents were asked to point out flavors and describe four other characteristics which they "liked," "disliked" or "neither,"

liked or disliked. The four characteristics for which respondents were asked to indicate their "like" or "dislike" were texture, spreadability, melting point and color. They were also asked to list flavors commonly found in butter such as sour cream, flat, salty, etc. and indicate their "like" or "dislike" for these distinguishable flavors. The scoring for these two parts was five points if they definitely liked it, four points if they liked it slightly, three points if they neither liked nor disliked it, two points if they disliked slightly, and one point if they definitely disliked the characteristic or flavor.

The grades of butter were manufactured and coded by the Dairy Department of South Dakota State College. Half of the Grade A butter was cultured for the purpose of accentuating in butter the desired flavor and aroma. Because there is no present standardized grading system for margarine, the quality of the margarine sample was not definitely known. Thus, the margarine sample may or may not have been a representative or average sample. A butter grader expressed the opinion that the quality of the margarine sample was below average; several consumer panel members made similar comments. Appendix A gives a complete discussion of the making of the four butter samples used in the survey.

Appendix C shows in tabular form the comparative preference for spreads in paired combinations for Brookings and Sioux Falls for all the factors making up the questionnaire. These tables show the relative preference for a spread such as Grade A butter with culture when compared with a second spread such as Grade B butter for a use

such as hot breads. The difference between the total points of these two spreads are shown in the last column.

The data for Tables XI-XXVI were taken from the corresponding tables in Appendix C for those same characteristics and uses. The first column is a summation of the total preference points for the designated spread. The second column is the difference between the total preference points for the two spreads; the sequence going from the highest to lowest total number of preference points. The third column is a summary of the last columns of the tables found in Appendix C. This column indicates the sum of the differences between each spread and the other spreads with which it was paired.

A summary of the relative rating of the five spreads for six common uses in the home is shown in the following tables (Tables XI-XVI). These factors included use on hot breads, other table uses, use on baked vegetables, seasoning, frying and baking.

Cultured Grade A butter was preferred over uncultured Grade A butter for use on hot breads by a margin of 37 votes (Table XI).

Table XI. Summary of Relative Preferences for Spreads for Use on Hot Breads, Brookings and Sioux Falls, 1955

Spread	Total Preference Points	Difference Between Totals	Sum of Differences Between pairs
Grade A, with culture	1099		278
Grade A, without culture	1062	37	204
Grade C	1014	48	108
Grade B	1004	10	88
Margarine	621	383	-678

Following in order of preference were Grade C and Grade B butter. Margarine was last, 383 points below Grade B butter. Compared on a paired basis cultured Grade A butter was given 278 points more preference than the spreads with which it was paired. At the other extreme margarine received 678 votes less than the spreads with which it was paired.

There was a preference for cultured Grade A butter over all the other spreads based on the factor, other table use. The order of preference was the same as far as use on hot breads, with margarine 336 points below Grade C butter. Margarine received 596 votes less than the spreads with which it had been paired (Table XII).

Table XII. Summary of Relative Preferences for Spreads for Use Based on Other Table Uses, Brookings and Sioux Falls, 1955

Spread	Total Preference Points	Difference Between Totals	Sums of Differences Between pairs
Grade A, with culture	1077		234
Grade A, without culture	1055	22	190
Grade B	1008	47	96
Grade C	998	10	76
<u>Margarine</u>	662	336	<u>-596</u>

A similar ranking was shown in the relative preference for use on baked vegetables with cultured Grade A receiving the most votes (Table XIII).

Cultured Grade A butter was preferred over Grade A without culture for seasoning (Table XIV). However, Grade C butter was

Table XIII. Summary of Relative Preferences for Spreads for Use on Baked Vegetables, Brookings and Sioux Falls, 1955

Spread	Total Preference Points	Difference Between Totals	Sum of Difference Between pairs
Grade A, with culture	1080		240
Grade A, without culture	1039	41	158
Grade B	1001	38	82
Grade C	974	27	28
Margarine	706	268	-508

Table XIV. Summary of Relative Preferences for Spreads for Use Based on Seasoning, Brookings and Sioux Falls, 1955

Spread	Total Preference Points	Difference Between Totals	Sum of Difference Between pairs
Grade A, with culture	1082		244
Grade A, without culture	1017	65	114
Grade C	1007	10	94
Grade B	1005	2	90
Margarine	689	316	-542

preferred over Grade B butter by a slight margin of 2 votes. Margarine was least preferred of all the spreads, being 316 points below Grade B butter. Margarine received 542 less votes than the spreads with which it was paired.

The relative preference of the spreads when used for frying or baking purposes showed a similar ranking (Tables XV and XVI). Cultured Grade A received the greatest number of votes followed by

Grade A without culture, Grade B, Grade C and margarine. Margarine received 396 votes less for frying purposes and 332 votes less for seasoning than the spreads with which it was paired. These two figures indicate that there was less difference between margarine and the other spreads than for the previous factors discussed.

Table XV. Summary of Relative Preferences for Spreads for Use Based on Frying, Brookings and Sioux Falls, 1955

Spread	Total Preference Points	Difference Between Totals	Sum of Differences Between pairs
Grade A, with culture	1070		220
Grade A, without culture	1010	60	100
Grade B	993	17	66
Grade C	965	28	10
Margarine	762	203	-396

Table XVI. Summary of Relative Preferences for Spreads for Use Based on Baking, Brookings and Sioux Falls, 1955

Spread	Total Preference Points	Difference Between Totals	Sum of Differences Between pairs
Grade A, with culture	1048		176
Grade A, without culture	994	54	68
Grade B	987	7	54
Grade C	977	10	34
Margarine	794	183	-332

A summary of the overall flavor rating of these spreads among the 40 families of the survey shows a small but consistent preference

for cultured Grade A butter (Table XVII). Cultured Grade A butter was preferred over uncultured Grade A butter for overall flavor by 86 votes. On a paired basis cultured Grade A butter was given 308 points more preference than the spreads with which it was paired. Margarine was considerably lower, receiving 606 votes less than the spreads with which it was paired.

Table XVII. Summary of Relative Preferences for Spreads for Use Based on Overall Flavor, Brookings and Sioux Falls, 1955

Spread	Total Preference Points	Difference Between Totals	Sum of Difference Between pairs
Grade A, with culture	1114		308
Grade A, without culture	1028	86	136
Grade B	1017	11	114
Grade C	984	33	48
Margarine	657	327	-606

The next group of tables shows greater variation in consumer preference for the five spreads (Tables XVIII, XIX, XX, XXI). Grade A butter with culture received 32 votes over Grade C butter which was the next grade preferred for saltiness (Table XVIII). Following in order of preference was Grade B butter, Grade A without culture and margarine. Cultured Grade A received 176 more preference votes than the four spreads with which it was paired while margarine was given 422 less votes than the spreads with which it was paired.

A relative preference for cultured Grade A was shown for the factor spreadability (Table XIX). The preference for Grades C and B

Table XVIII. Summary of Relative Preferences for Spreads for Use Based on Saltiness, Brookings and Sioux Falls, 1955

Spread	Total Preference Points	Difference Between Totals	Sum of Difference Between pairs
Grade A, with culture	1048		176
Grade C	1016	32	112
Grade B	1006	10	92
Grade A, without culture	981	25	42
<u>Margarine</u>	<u>749</u>	<u>232</u>	<u>422</u>

Table XIX. Summary of Relative Preferences for Spreads for Use Based on Spreadability, Brookings and Sioux Falls, 1955 (Ranking Basis)

Spread	Total Preference Points	Difference Between Totals	Sum of Difference Between pairs
Grade A, with culture	1078		245
Grade B	1039	39	149
Grade C	1030	9	140
Grade A, without culture	1026	4	132
<u>Margarine</u>	<u>627</u>	<u>399</u>	<u>666</u>

over uncultured Grade A is again exhibited in this table with margarine receiving a noticeably smaller number of preference points.

The difference in total preference points for the first four spreads was less, as would be expected for a non-flavor factor.

The texture of butter is difficult to evaluate as indicated in the relative preference for this factor (Table XX). Grade A with

culture again received the largest number of total preference points, receiving 1016, but was closely followed by Grade B butter with 1009. Uncultured Grade A butter received only 5 more votes than Grade C butter which was preferred fourth. Margarine received the least number of preference points, 808, and also received 304 votes less than the spreads with which it was paired.

Table XX. Summary of Relative Preferences for Spreads for Use Based on Texture, Brookings and Sioux Falls, 1955 (Ranking Basis)

Spread	Total Preference Points	Difference Between Totals	Sum of Difference Between pairs
Grade A, with culture	1016		112
Grade B	1009	7	98
Grade A, without culture	986	29	52
Grade C	981	5	42
Margarine	808	173	-304

For spreadability and appearance, the five spreads ranked in the same position (Table XXI). Again, the difference in total preference points among the four spreads was relatively small.

There is indication that preference for certain characteristics in a particular sample produced a carry-over effect on the preference for the remaining characteristics of that spread. For instance, when the flavor qualities of the cultured Grade A butter were preferred over non-cultured Grade A butter, other non-flavor characteristics of the cultured sample, such as texture and spreadability, were preferred even though these butter characteristics were identical in the two samples.

Table XXI. Summary of Relative Preferences for Spreads for Use Based on Appearance, Brookings and Sioux Falls, 1955

Spread	Total Preference Points	Difference Between Totals	Sum of Difference Between Pairs
Grade A, with culture	1070		220
Grade B	1049	21	178
Grade C	1042	7	164
Grade A, without culture	1005	37	90
Margarine	634	371	-652

Tables XXII-XXVI refer to the last two sections of the questionnaire. Part II of the questionnaire asked respondents to describe flavors liked or disliked in each sample spread; part III asked respondents to describe their like or dislike of the texture, spreadability, melting point and color of each sample. A summary of the relative preference of characteristic flavor on a non-ranking basis indicates that uncultured Grade A butter received 2 more votes than cultured Grade A butter. Following in order of preference were Grade B, Grade C and margarine. However, when compared on a paired basis, cultured Grade A was given more preference points than Grade A without culture. Grade C butter and margarine received one and 366 votes less respectively, than the spreads with which they were paired (Table XXII).

The last section of the questionnaire asked the panel members whether they "liked" or "disliked" the five sample spreads for texture, spreadability, color, and melting point (Tables XXIII, XXIV,

Table XXII. Summary of Relative Preferences for Spreads for Use Based on Characteristic Flavor, Brookings and Sioux Falls, 1955

Spread	Total Preference Points	Difference Between Totals	Sum of Difference Between pairs
Grade A, without culture	1223		145
Grade A, with culture	1221	2	174
Grade B	1178	43	48
Grade C	1080	98	-1
Margarine	870	210	-366

XXV, and XXVI). Cultured Grade A was preferred over uncultured Grade A in the relative preference of the four important characteristics. Grade B butter was preferred over Grade C butter in all four characteristics, except spreadability where Grade C received 7 more preference votes. Margarine received the least number of total preference points for all of these common characteristics and also received less votes than the spreads with which it was paired.

Information was gathered on the influence of national origin, occupation, rural or urban background, size of family, and family income on preferences for the five spreads used in the survey. These preferences were checked for three important factors: hot breads, other table uses and overall flavor. There seemed to be no pronounced pattern from which any conclusions could be made. There was a slight indication that larger families preferred butter over margarine; however, this preference for butter was not very great. This may be partially true as indicated in other studies where

Table XXIII. Summary of Relative Preferences for Spreads for Use Based on Texture, Brookings and Sioux Falls, 1955 (Non-ranking Basis)

Spread	Total Preference Points	Difference Between Totals	Sum of Difference Between pairs
Grade A, with culture	1237		132
Grade A, without culture	1218	19	92
Grade B	1202	16	75
Grade C	1191	11	75
Margarine	890	301	-374

Table XXIV. Summary of Relative Preferences for Spreads for Use Based on Spreadability, Brookings and Sioux Falls, 1955 (Non-ranking Basis)

Spread	Total Preference Points	Difference Between Totals	Sum of Difference Between pairs
Grade A, with culture	1276		133
Grade A, without culture	1257	19	77
Grade C	1240	17	105
Grade B	1233	7	89
Margarine	928	305	-404

larger families have used more margarine.

The consumer panel showed a slight, but consistent preference for cultured Grade A butter over Grade A butter without culture. This pattern is characteristic of South Dakota families who have consumed more butter with a definite flavor. Thus they indicated a relative preference for Grade A butter with culture which had the

Table XXV. Summary of Relative Preferences for Spreads for Use Based on Melting Point, Brookings and Sioux Falls, 1955 (Non-ranking Basis)

Spread	Total Preference Points	Difference Between Totals	Sum of Difference Between pairs
Grade A, without culture	1206		65
Grade A, with culture	1193	13	80
Grade B	1170	23	62
Grade C	1166	4	62
Margarine	959	207	-269

Table XXVI. Summary of Relative Preference for Spreads for Use Based on Color, Brookings and Sioux Falls, 1955 (Non-ranking Basis)

Spread	Total Preference Points	Difference Between Totals	Sum of Difference Between parts
Grade A, without culture	1262		113
Grade A, with culture	1242	20	36
Grade B	1221	21	92
Grade C	1210	11	92
Margarine	897	313	-333

added flavor and aroma. The greatest difference in preference of consumers was shown for such factors as hot breads, other table uses, overall flavor, and spreadability. The least difference between the high quality spreads, cultured Grade A butter and margarine, was found in the factors texture, baking, and saltiness. One would expect such a pattern, especially for a factor such as baking where

the flavor of the spread cannot often be detected.

This study showed that the panel members preferred the higher grades of butter when price was not an important factor and that they had preferred all grades of butter over the sample of margarine on a non-price ranking basis. The preference for the higher grades of butter was present in the factors associated with qualities of flavor. The preference for uncultured Grade A butter was not very consistent in such non-flavor factors as spreadability, texture, appearance, and saltiness. The general preferences of the consumer panel members rather closely followed the federal standards for ranking butter grades.

CHAPTER VI

SUMMARY AND CONCLUSIONS

The objectives of this study were: (1) to determine consumption patterns of all fats and oils used in the survey homes; (2) to determine the range and intensity of the consumer preferences between grades of butter and other spreads; and (3) to determine whether taste preferences of consumers coincide with the present Federal grading system for graded butter and the margarine sample.

The preliminary survey indicated that more butter than margarine was used in the two population samples. Most of the families consumed from 1.00 to 1.99 pounds of butter or margarine weekly. More families were using butter alone than margarine alone, with nearly one-third of the families using a combination of butter and margarine. The people indicated a preference for butter because of its taste for use on hot breads and when used for seasoning.

Data of a personal nature, other family characteristics, the financial status, and intensity for characteristics and uses of fats and oils were gathered in an attempt to determine whether these factors may greatly influence the consumption of butter, margarine or other fats and oils. The preliminary survey showed no definite relationship between the consumption patterns and these so-called "influential" factors. A statistical analysis of the effect of income on butter consumption showed a positive relationship; a similar analysis of margarine consumption indicated a negative

relationship. The level of income did not consistently affect the relative consumption of butter and margarine. Price was an important reason given for the purchase of margarine in the preliminary survey.

The consumer panel survey indicated that these people preferred a high quality butter with some flavor and aroma which was found in cultured Grade A butter. The consumer panel survey indicated that most of the members preferred cultured Grade A butter followed by Grade A butter without culture, Grade B butter, Grade C butter and margarine. This trend was especially evident in the factors where flavor was an essential condition such as use on hot breads, other table uses, overall flavor, baked vegetables, seasoning and frying. There was no definite pattern of preference in such non-flavor factors as spreadability, texture and appearance.

The results of this survey showed that (1) the total consumption of butter was greater than margarine in the two populations; (2) such factors as occupation, annual family income, or facts associated with place of birth, national origin, rural or urban background and religious preference did not greatly influence the consumption of butter and margarine and the other fats and oils commonly used in the home; and (3) the present Federal grading system compared quite favorably with the preferences of the consumers in the panel survey when price was not an important consideration, except for cultured butter.

This study suggests the need for further research on characteristic flavors in butter disliked by consumers. Consumers should

be informed on how to distinguish the flavors and other characteristics which identify the various grades of butter. Additional research should be inaugurated on determining the effects of variation in quality on total butter demand as well as on the effect of the price differential between butter and margarine. The results of this study and other studies should enable the dairy farmer to better adjust his methods of production to fit the preferences of butter consumers.

LITERATURE CITED

- Benning, Leonard and Seas, Shirley, Know Your Grades of Butter, Extension Circular 530, South Dakota State College, November, 1955.
- Boulding, Kenneth F., Economic Analysis, Revised Edition, Harper and Brothers Publishers, New York, 1948.
- Breazeale, D.F., and Feder, Ernest, "How Marketing and Processing Methods Affect Butter Quality," South Dakota Farm and Home Research, Winter, 1952, Volume III, Number 2, Agricultural Economics and Dairy Departments, Agricultural Experiment Station, South Dakota State College.
- Cox, Rex W., Competition Between Butter and Margarine, Minneapolis, 1952, Station Bulletin 417, Agricultural Experiment Station, University of Minnesota, June, 1953.
- Giemark, Edwin A., "A Study and Analysis of Consumer Grade Labeling," American Milk Review, An Urner-Barry Publication, New York, March, 1956.
- Household Purchases of Butter, Margarine, Cheese, Non-fat Dry Milk Solids, by Family Characteristics, April-September, 1955, H-PD-20, United States Department of Agriculture, Agricultural Marketing Service, Washington, D.C., March, 1956.
- Know Your Butter Grades, Leaflet Number 264, Revised, United States Department of Agriculture, Washington, D.C., February, 1956.
- Milk and Its Products, AIB, Number 125, United States Department of Agriculture, Washington, D.C., May, 1954.
- Shaffer, J.D., and Quackenbush, G.G., Consumer Purchases of Butter and Oleomargarine, Technical Bulletin 248, Michigan State College, Agricultural Experiment Station, Department of Agricultural Economics, East Lansing, April, 1955.
- Weavers, U.J., "Grade Labeling of Butter in Wisconsin," The Milk Products Journal, An Olsen Publication, Milwaukee, Wisconsin, January, 1956.

APPENDIX A

22
44

APPENDIX A

BUTTER RESEARCH

The Manufacturing Process

The samples of butter for the consumer panel survey were made from 736 pounds of fresh sweet cream purchased from Sioux Valley Cooperative on October 18, 1955. The cream had a .12 per cent acid content upon arrival at the creamery of South Dakota State College.

Half of the cream sample was pasteurized while the other half was set out in the creamery. The 368 pounds of cream was pasteurized at 160° F. for a period of 30 minutes. After the pasteurization process had taken place, the cream was cooled to 40° F. and held over night. The following day the cream was churned at 51° F. after which the butter granules were worked until dry. The moisture test showed a reading of 13.3.

The pasteurized cream was divided into two equal parts from which the cultured and uncultured Grade A butter samples were made for the consumer panel. Half of the sample received starter culture, starter distillate, salt and water while the other half received only water and salt. When the samples had been worked to their proper dryness, they were placed in fridays, which are false bottom steel containers, for making pound or quarter pound butter samples. These samples were stored until the 22nd of October when they were made into quarter pound prints. After printing and coding the samples,

they were placed in sharp freeze and then in cold storage at a -20° F. These samples were designated A+ which was the cultured sample and A- which was the uncultured sample.

The Grade B sample was left in the creamery at room temperature for two and one-half days. The 183 pound cream sample was regularly checked for acidity during this period and was pasteurized at the end of the two and one-half day period. The acidity of the raw cream was .42 percent. However, this was neutralized down to .18 per cent by using 160 grams of neutraline. This sample was pasteurized at 160° F. for a period of 30 minutes. The sample was cooled to 40° F. and held over night for churning the following morning. The churning temperature was 51° F. and the moisture content was 13.1 per cent. Water and salt were added and the sample was worked until it was dry. The Grade B butter was printed in quarter pound samples on October 25th. The butter was also sharp frozen and then placed in cold storage.

The cream for the Grade C butter sample was left in the creamery at room temperature until October 21st. Acidity tests were also taken regularly on the 185 pound cream sample with the acidity reading showing .60 per cent. The sample was pasteurized and neutralized with 285 grams of neutraline. The neutralizer was placed in the sample very quickly at about 120° F. The cream was held at 160° F. and then cooled to 40° F. and held over night. The cream was churned at 51° F. and the correct amounts of salt and water were added. This butter was printed and cooled on October 25th, placed in the sharp freeze and then in cold storage.

All of this cream was held in ten gallon cans as it was received. The cream was held at an average temperature of 60° to 65° F. The margarine sample was purchased at Park Grant Wholesalers on October 26th. The margarine was rewrapped in plain paper and coded. All of the margarine was also sharp frozen and placed in cold storage in a similar manner to the butter samples. The first samples of butter and margarine were delivered to the consumer panel members on October 28th and the last samples were delivered December 30th.

The butter was graded by Mr. E.R. Bartle, U.S.D.A. butter grader, on November 8th, 1955. The butter grades were as follows:

Grade A with culture	A - 92½	Slightly Feedy
Grade A without culture	AA - 93	
Grade B	91	Slightly Neutralized
Grade C	89	Definitely Neutralized
Margarine	No grade	

The following is a creamery report giving a detailed report of the manufacturing, quality, and handling of the four butter grades and the margarine sample. Dr. Roscoe Baker of the Dairy Department made a complete chemical analysis of every butter sample as well as the margarine sample used for the consumer panel survey.

GRADE A BUTTER WITH CULTURE

Manufacturing Dates

Pasteurized	October 18
Churned	October 19
Printed	October 22
Pounds Raw Cream	184 lbs. fat - 73.8 lbs. butterfat
Raw Cream Acidity	.12 of 1%
Pasteurizing Temperature	160° F. - 30 minutes
Time Held Before Churning	Overnight
Amount of Coloring	10 cc
Churning Time	30 minutes
Rate of Salt	2% - 1.82 pounds
Rate of Starter	2% - 1.82 pounds
Distillate	8 cc
First Moisture	13.3 per cent
Churning Temperature	51° F.

Chemical Analysis by Dr. Roscoe Baker

Moisture	16.20% - water
Salt	1.80%
Yeast and Molds	2/ml
Coliforms	0/ml
Curd	.90%
Keeping Quality	O.K.
PH	5.92
Fat	81.10%

GRADE A WITHOUT CULTURE OR DISTILLATE REPORT

Manufacturing Dates

Pasteurized	October 18
Churned	October 19
Printed	October 22
Pounds Raw Cream	184 lbs. fat - 73.8 lbs. butterfat
Raw Cream Acidity	.12 of 1%
Pasteurizing Temperature	160° F. - 30 minutes
Time Held Before Churning	Overnight
Churning Temperature	51° F.
Amount of Coloring	10 cc
Churning Time	30 minutes
Rate of Salt	2% - 1.82 pounds
Rate of Starter	None
Distillate	None
First Moisture	13.3%

Chemical Analysis by Dr. Roscoe Baker

Moisture	16.40% - water
Salt	1.65%
Curd	.70%
Yeast and Mold	2/ml
Coliforms	0/ml
Keeping Quality	O.K.
PH	6.68
Fat	81.25%

GRADE B BUTTER

Manufacturing Dates

Pasteurized	October 20
Churned	October 21
Printed	October 25
Pounds of Raw Cream	183 lbs. fat - 69.0 lbs. butterfat
Raw Cream Acidity	.42 of 1% reduced to .18%
Pasteurizing Temperature	160° F. - 30 minutes
Neutralizer Used	160 grams
Time Held Before Churning	Overnight
Churning Temperature	51° F.
Amount of coloring	10 cc
Churning Time	30 minutes
Rate of Salt	2% - 1.0 pounds
Rate of Starter	None
Distillate Used	None
First Moisture	13.1%

Chemical Analysis by Dr. Roscoe Baker

Moisture	16.70% - water
Salt	1.50%
Curd	.60%
Yeast and Mold	2/ml
Coliforms	7/ml
Keeping Quality	C.K.
PH	6.18
Fat	81.20%

GRADE C BUTTER

Manufacturing Dates

Pasteurized	October 21
Churned	October 22
Printed	October 25
Pounds of Raw Cream	185 lbs. fat - 74 lbs. butterfat
Raw Cream Acidity	.60% reduced to .18%
Pasteurizing Temperature	160° F. - 30 minutes
Neutralizer Used	285 grams
Time Held Before Churning	Overnight
Churning Temperature	51° F.
Amount of Coloring	10 cc
Churning Time	20 minutes
Rate of Salt	2% - 1.8 pounds
Rate of Starter	None
Distillate Used	None
First Moisture	13.5%

Chemical Analysis by Dr. Roscoe Baker

Moisture	15.50% - water
Salt	1.70%
Curd	.60%
Yeast and Mold	1/ml
Coliforms	0/ml
Keeping Quality	O.K.
PH	6.65
Fat	82.20%

OLEOMARGARINE

Chemical Analysis by Dr. Roscoe Baker

Moisture	14.95%
Salt	3.10%
Curd	1.55%
Yeast and Mold	260/ml (yeast)
Chloroforms	0/ml
Keeping Quality	O.K.
PH	4.33
Fat	80.40%

The spreads were regraded by E.R. Bartle on January 24, 1956.

1. - C grade - Definite Neutralized
2. - No grade - Margarine
3. - A+ grade - Slightly Aged
4. - A+ grade - Slightly Aged - Starter Dist.
5. - B grade - Slightly Neutralized

APPENDIX B

Table I. Distribution of Families by Occupation of Head of Household and Butter Consumption Per Family, Brookings, South Dakota, Summer, 1955

Occupation	Total	Butter consumption per family (pounds per week)				
		None	.01-.99	1.00-1.99	2.00-2.99	3.00 & over
		number of families				
Unskilled labor	2	1	0	0	1	0
Semi-skilled labor	2	0	0	1	0	1
Skilled labor, foreman	8	2	2	2	2	0
Clerical, salesman	10	3	0	2	4	1
Entrepreneurs, executives	5	1	0	1	2	1
Professional, teachers	9	2	1	5	1	0
Unclassified	1	1	0	0	0	0
Not gainfully employed	13	3	2	5	2	1
Total	50	13	5	16	12	4

Table II. Distribution of Families by Occupation of Head of Household and Butter Consumption Per Family, Sioux Falls, South Dakota, Summer, 1955

Occupation	Total	Butter consumption per family (pounds per week)				
		None	.01-.99	1.00-1.99	2.00-2.99	3.00 & over
		number of families				
Unskilled labor	15	1	1	10	1	2
Semi-skilled labor	50	15	4	22	8	1
Skilled labor, foreman	53	15	3	20	14	1
Clerical, salesman	82	17	7	37	18	3
Entrepreneurs, executives	20	3	0	11	5	1
Professional, teaching	23	3	3	11	3	3
Unclassified	28	6	3	10	6	3
Not gainfully employed	51	10	13	23	5	0
Total	322	70	34	144	60	14

Table III. Distribution of Families by Occupation of Head of Household and Butter Consumption Per Consuming Unit, Brookings, South Dakota, Summer, 1955

Occupation	Total	Butter consumption per consuming unit (pounds per week)				
		None	.01-.49	.50-.99	1.00-1.49	1.50 & over
		number of families				
Unskilled labor	2	1	0	1	0	0
Semi-skilled labor	2	0	0	1	0	1
Skilled labor, foreman	8	2	1	4	1	0
Clerical, salesman	10	2	2	4	1	1
Entrepreneurs, executives	5	1	0	2	2	0
Professional, teachers	9	3	1	4	1	0
Unclassified	1	1	0	0	0	0
Not gainfully employed	13	3	1	6	2	1
Total	50	13	5	22	7	3

Table IV. Distribution of Families by Occupation of Head of Household and Butter Consumption Per Consuming Unit, Sioux Falls, South Dakota, Summer, 1955

Occupation	Total	Butter consumption per consuming unit (pounds per week)				
		None	.01-.49	.50-.99	1.00-1.49	1.50 & over
		number of families				
Unskilled labor	15	1	4	7	2	1
Semi-skilled labor	50	15	11	16	8	0
Skilled labor, foreman	53	13	9	23	8	0
Clerical, salesman	82	18	19	32	12	1
Entrepreneurs, executives	20	3	4	11	1	1
Professional, teachers	23	4	4	10	4	1
Unclassified	28	6	5	11	5	0
Not gainfully employed	51	10	12	21	6	2
Total	322	70	69	131	46	6

Table V. Distribution of Families by Occupation of Head of Household and Margarine Consumption Per Family, Brookings, South Dakota, Summer, 1955

Occupation	Total	Margarine consumption per family (pounds per week)				
		None	.01-.99	1.00-1.99	2.00-2.99	3.00 & over
		number of families				
Unskilled labor	2	0	0	2	0	0
Semi-skilled labor	2	1	0	1	0	0
Skilled labor, foremen	8	3	1	2	2	0
Clerical, salesman	10	4	1	3	1	1
Entrepreneurs, executives	5	4	1	0	0	0
Professional, teachers	9	3	0	5	1	0
Unclassified	1	0	0	0	1	0
Not gainfully employed	13	7	2	3	0	1
Total	50	22	5	16	5	2

Table VI. Distribution of Families by Occupation of Head of Household and Margarine Consumption Per Family, Sioux Falls, South Dakota, Summer 1955

Occupation	Total	Margarine consumption per family (pounds per week)				
		None	.01-.99	1.00-1.99	2.00-2.99	3.00 & over
		number of families				
Unskilled labor	15	8	4	3	0	0
Semi-skilled labor	50	21	6	10	7	6
Skilled labor, foreman	53	20	10	16	6	1
Clerical, salesman	82	33	23	20	2	4
Entrepreneurs, executives	20	10	1	6	2	1
Professional, teachers	23	13	3	3	2	2
Unclassified	28	18	1	6	2	1
Not gainfully employed	51	24	14	10	2	1
Total	322	147	62	74	23	16

Table VII. Distribution of Families by Occupation of Head of Household and Margarine Consumption Per Consuming Unit, Brookings, South Dakota, Summer, 1955

Occupation	Total	Margarine consumption per consuming unit (pounds per week)				
		None	.01-.49	.50-.99	1.00-1.49	1.50 & over
		number of families				
Unskilled labor	2	0	1	1	0	0
Semi-skilled labor	2	1	0	1	0	0
Skilled labor, foreman	8	3	2	2	1	0
Clerical, salesman	10	4	3	2	0	1
Entrepreneurs, executives	5	4	1	0	0	0
Professional, teachers	9	3	4	2	0	0
Unclassified	1	0	0	1	0	0
Not gainfully employed	13	7	2	2	1	1
Total	50	22	13	11	2	2

Table VIII. Distribution of Families by Occupation of Head of Household and Margarine Consumption Per Consuming Unit, Sioux Falls, South Dakota, Summer, 1955

Occupation	Total	Margarine consumption per consuming unit (pounds per week)				
		None	.01-.49	.50-.99	1.00-1.49	1.50 & over
		number of families				
Unskilled labor	15	8	6	1	0	0
Semi-skilled labor	50	22	13	11	2	2
Skilled labor, foreman	53	20	16	12	4	1
Clerical, salesman	82	36	30	11	4	1
Entrepreneurs, executives	20	11	2	3	4	0
Professional, teachers	23	13	5	4	1	0
Unclassified	28	19	4	3	2	0
Not gainfully employed	51	26	13	10	2	0
Total	322	155	89	55	19	4

Table IX. Distribution of Families by Family Income and Butter Consumption Per Family, Brookings, South Dakota, Summer, 1955

Annual Family income	Total	Butter consumption per family (pounds per week)				
		None	.01-.99	1.00-1.99	2.00-2.99	3.00 & over
		number of families				
Less than \$2,000	5	0	1	3	0	1
2,000 - 2,999	5	2	1	2	0	0
3,000 - 3,999	13	4	0	2	6	1
4,000 - 4,999	16	4	2	4	4	2
5,000 - 5,999	4	0	0	3	1	0
6,000 - 6,999	2	0	0	0	2	0
7,000 - 7,999	1	0	0	1	0	0
Unknown	4	1	1	1	1	0
Total	50	11	5	16	14	4

Table XI. Distribution of Families by Family Income and Butter Consumption Per Consuming Unit, Brookings, South Dakota, Summer, 1955

Annual Family income	Total	Butter consumption per consuming unit (pounds per week)				
		None	.01-.49	.50-.99	1.00-1.49	1.50 & over
		number of families				
less than \$2,000	5	0	1	2	1	1
2,000 - 2,999	5	3	0	2	0	0
3,000 - 3,999	13	3	1	6	2	1
4,000 - 4,999	16	4	1	9	2	0
5,000 - 5,999	4	0	1	2	1	0
6,000 - 6,999	2	0	0	1	0	1
7,000 - 7,999	1	0	1	0	0	0
Unknown	4	1	1	1	1	0
Total	50	11	6	23	7	3

Table XII. Distribution of Families by Family Income and Butter Consumption Per Consuming Unit, Sioux Falls, South Dakota, Summer, 1955

Annual Family income	Total	Butter consumption per consuming unit (pounds per week)				
		None	.01-.49	.50-.99	1.00-1.49	1.50 & over
		number of families				
Less than \$2,000	26	7	5	9	4	1
2,000 - 2,999	19	5	5	6	1	2
3,000 - 3,999	50	14	14	19	3	0
4,000 - 4,999	78	17	13	32	15	1
5,000 - 5,999	52	11	9	22	9	1
6,000 - 6,999	17	6	4	5	2	0
7,000 - 7,999	18	6	3	7	2	0
8,000 - 8,999	4	0	1	2	1	0
9,000 - 9,999	3	0	0	3	0	0
10,000 - over	10	1	3	3	2	1
Unknown	45	6	12	19	7	1
Total	322	73	69	127	46	7

Table XIII. Distribution of Families by Family Income and Margarine Consumption Per Family, Brookings, South Dakota, Summer, 1955

Annual Family income	Total	Margarine consumption per family (pounds per week)				
		None	.01-.99	1.00-1.99	2.00-2.99	3.00 & over
		number of families				
less than \$2,000	5	2	0	2	0	1
2,000 - 2,999	5	3	1	1	0	0
3,000 - 3,999	13	3	1	7	2	0
4,000 - 4,999	16	9	1	4	1	1
5,000 - 5,999	4	1	1	2	0	0
6,000 - 6,999	2	2	0	0	0	0
7,000 - 7,999	1	0	0	0	1	0
Unknown	4	4	0	0	0	0
Total	50	24	4	16	4	2

Table XIV. Distribution of Families by Family Income and Margarine Consumption Per Family, Sioux Falls, South Dakota, Summer, 1955

Annual Family income	Total	Margarine consumption per family (pounds per week)				
		None	.01-.99	1.00-1.99	2.00-2.99	3.00 & over
		number of families				
Less than \$2,000	26	14	7	5	0	0
2,000 - 2,999	19	6	8	3	2	0
3,000 - 3,999	50	16	11	15	4	4
4,000 - 4,999	78	34	17	16	6	5
5,000 - 5,999	52	22	12	11	4	3
6,000 - 6,999	17	8	3	4	2	0
7,000 - 7,999	18	10	1	4	3	0
8,000 - 8,999	4	3	0	1	0	0
9,000 - 9,999	3	3	0	0	0	0
10,000 - over	10	5	0	3	0	2
Unknown	45	28	4	9	3	1
Total	322	149	63	71	24	15

Table XV. Distribution of Families by Family Income and Margarine Consumption Per Consuming Unit, Brookings, South Dakota, Summer, 1955

Annual Family income	Total	Margarine consumption per consuming unit (pounds per week)				
		None	.01-.49	.50-.99	1.00-1.49	1.50 & over
		number of families				
Less than \$2,000	5	2	1	1	0	1
2,000 - 2,999	5	3	0	1	1	0
3,000 - 3,999	13	3	5	4	1	0
4,000 - 4,999	16	9	3	3	0	1
5,000 - 5,999	4	1	2	1	0	0
6,000 - 6,999	2	2	0	0	0	0
7,000 - 7,999	1	0	1	0	0	0
Unknown	4	4	0	0	0	0
Total	50	24	12	10	2	2

Table XVI. Distribution of Families by Family Income and Margarine Consumption Per Consuming Unit, Sioux Falls, South Dakota, Summer, 1955

Annual Family income	Total	Margarine consumption per consuming unit (pounds per week)				
		None	.01-.49	.50-.99	1.00-1.49	1.50 & over
		number of families				
Less than \$2,000	26	11	6	9	0	0
2,000 - 2,999	19	9	5	4	0	1
3,000 - 3,999	50	16	18	12	4	0
4,000 - 4,999	78	34	24	12	6	2
5,000 - 5,999	52	25	17	8	2	0
6,000 - 6,999	17	6	4	5	2	0
7,000 - 7,999	18	10	3	1	3	1
8,000 - 8,999	4	3	1	0	0	0
9,000 - 9,999	3	3	0	0	0	0
10,000 - over	10	5	2	1	2	0
Unknown	45	27	10	8	0	0
Total	322	149	90	60	19	4

Table XVII. Butter and Margarine Consumption Per Family by Occupation of Head of Household, Brookings, South Dakota, Summer, 1955

Occupation	Type of spread				
	Combined spreads	Butter only	Margarine only	Butter with Margarine	Margarine with Butter
	(pounds per family per week)				
Unskilled labor	2.00	.0	1.00	2.00	1.00
Semi-skilled labor	3.00	4.00	.0	1.00	1.00
Skilled labor, foreman	1.95	1.88	1.00	1.17	1.20
Clerical, salesman	2.23	1.81	1.83	2.00	1.17
Entrepreneurs, executives	1.75	2.33	.0	1.00	.75
Professional, teachers	1.75	1.25	1.00	1.25	1.25
Unclassified	2.00	.0	2.00	.0	.0
Not gainfully employed	1.85	1.06	.75	2.00	2.67
Average	1.97	1.65	1.30	1.53	1.43

Table XVIII. Butter and Margarine Consumption Per Consuming Unit by Occupation of Head of Household, Brookings, South Dakota, Summer, 1955

Occupation	Type of spread				
	Combined spreads	Butter only	Margarine only	Butter with Margarine	Margarine with Butter
	(pounds per consuming unit per week)				
Unskilled labor	.75	.0	.56	.57	.29
Semi-skilled labor	1.46	1.74	.0	.56	.56
Skilled labor, foreman	.82	.71	.37	.61	.63
Clerical, salesman	.91	.85	.81	.65	.38
Entrepreneurs, high salaried executives	1.00	1.01	.0	.56	.42
Professional, teachers	.81	.83	.45	.47	.47
Unclassified	.71	.0	.71	.0	.0
Not gainfully employed	1.13	.66	.65	.98	1.31
Average	.94	.83	.63	.63	.59

Table XIX. Butter and Margarine Consumption Per Family by Family Income
 Brookings, South Dakota, Summer, 1955

Annual Family income	Type of spread				
	Combined spreads	Butter only	Margarine only	Butter with Margarine	Margarine with Butter
(pounds per family per week)					
Less than \$2,000	3.10	.75	.0	2.00	2.67
2,000 - 2,999	.80	.83	.75	.0	.0
3,000 - 3,999	2.31	2.67	1.38	1.67	1.08
4,000 - 4,999	1.91	1.83	1.50	1.50	1.20
5,000 - 5,999	1.94	2.00	.0	1.00	.92
6,000 - 6,999	2.00	2.00	.0	.0	.0
7,000 - 7,999	3.00	.0	.0	1.00	2.00
Unknown	.88	1.17	.0	.0	.0
Average	1.97	1.65	1.30	1.53	1.43

Table XX. Butter and Margarine Consumption Per Consuming Unit by Family Income
 Brookings, South Dakota, Summer, 1955

Annual Family income	Combined spreads	Type of spread			
		Butter only	Margarine only	Butter with Margarine	Margarine with Butter
(pounds per consuming unit per week)					
Less than \$2,000	1.96	.83	.0	.98	1.31
2,000 - 2,999	.57	.53	.65	.0	.0
3,000 - 3,999	.89	1.07	.52	.64	.42
4,000 - 4,999	.85	.78	.75	.68	.54
5,000 - 5,999	.99	1.11	.0	.50	.46
6,000 - 6,999	1.29	1.23	.0	.0	.0
7,000 - 7,999	.68	.0	.0	.23	.45
Unknown	.64	.64	.0	.0	.0
Average	.94	.83	.63	.63	.59

Table XXI. Butter and Margarine Consumption Per Family by Occupation of Head of Household, Sioux Falls, South Dakota, Summer, 1955

Occupation	Consumption per family				
	All spreads	Butter only	Margarine only	Butter with Margarine	Margarine with Butter
	(pounds per week)				
Unskilled labor	1.70	1.68	1.00	1.12	.70
Semi-skilled labor	1.89	1.38	2.16	1.31	1.18
Skilled labor, foreman	1.79	1.66	1.35	1.40	.93
Clerical, salesman	1.71	1.56	1.43	1.30	.77
Entrepreneurs, executives	2.00	1.64	1.63	1.40	1.70
Professional, teachers	1.85	1.48	2.12	1.46	1.04
Unclassified	1.70	1.63	1.21	1.33	1.83
Not gainfully employed	1.26	1.06	1.05	.92	.80
Average	1.71	1.48	1.53	1.26	.95

Table XXII. Butter and Margarine Consumption Per Consuming Unit by Occupation of Head of Household, Sioux Falls, South Dakota, Summer, 1955

Occupation	Consumption per consuming unit				
	All spreads	Butter only	Margarine only	Butter with Margarine	Margarine with Butter
	(pounds per week)				
Unskilled labor	.74	.86	.30	.44	.28
Semi-skilled labor	.78	.68	.81	.47	.42
Skilled labor, foreman	.83	.78	.67	.61	.41
Clerical, salesman	.80	.74	.67	.59	.35
Entrepreneurs, executives	.89	.71	1.00	.53	.64
Professional, teachers	.78	.66	.72	.63	.45
Unclassified	.72	.76	.56	.56	.76
Not gainfully employed	.77	.74	.68	.45	.39
Average	.80	.73	.71	.54	.41

Table XXIII. Butter and Margarine Consumption Per Family by Family Income, Sioux Falls, South Dakota, Summer, 1955

Annual Family income	Consumption per family				
	All spreads	Butter only	Margarine only	Butter with Margarine	Margarine with Butter
	(pounds per week)				
less than \$2,000	.99	.91	.75	.79	.63
2,000 - 2,999	1.45	1.36	.97	1.36	.86
3,000 - 3,999	1.77	1.47	1.57	1.11	1.04
4,000 - 4,999	1.89	1.54	2.14	1.34	.84
5,000 - 5,999	1.86	1.64	1.50	1.39	.96
6,000 - 6,999	1.46	1.25	1.21	1.83	.67
7,000 - 7,999	1.72	1.75	1.67	1.00	.75
8,000 - 8,999	1.69	1.42	.0	1.50	1.00
9,000 - 9,999	2.00	2.00	.0	.0	.0
10,000 - over	2.40	2.00	2.25	1.33	1.83
Unknown	1.57	1.39	1.25	1.28	1.11
Average	1.70	1.47	1.54	1.25	.94

Table XXIV. Butter and Margarine Consumption Per Consuming Unit by Family Income
Sioux Falls, South Dakota, Summer, 1955

Annual Family income	Consumption per consuming unit				
	All spreads	Butter only	Margarine only	Butter with Margarine	Margarine with Butter
	(pounds per week)				
Less than \$2,000	.78	.81	.50	.57	.47
2,000 - 2,999	.86	.84	.76	.50	.41
3,000 - 3,999	.76	.69	.64	.46	.43
4,000 - 4,999	.86	.76	.90	.59	.37
5,000 - 5,999	.81	.78	.64	.54	.37
6,000 - 6,999	.75	.64	.69	.83	.30
7,000 - 7,999	.76	.72	.84	.44	.33
8,000 - 8,999	.79	.90	.0	.41	.26
9,000 - 9,999	.77	.77	.0	.0	.0
10,000 - over	.98	.83	1.10	.48	.67
Unknown	.69	.65	.45	.55	.48
Average	.80	.73	.71	.54	.40

Table XXV. Number of Families Consuming Selected Fats and Oils Per Week by Family Income, Brookings, South Dakota, Summer, 1955

Annual Family income	Type of Fat or Oil Consumed						
	Butter	Margarine	Lard	Shortening	Cooking oils	Sandwich spreads	Salad dressings
	number of families						
Less than \$2,000	5	3	0	4	0	3	0
2,000 - 2,999	3	2	3	2	0	2	2
3,000 - 3,999	9	10	3	11	3	8	8
4,000 - 4,999	12	7	7	14	4	12	15
5,000 - 5,999	4	3	2	3	2	4	4
6,000 - 6,999	2	0	0	2	0	2	2
7,000 - 7,999	1	1	1	1	1	0	1
Unknown	3	0	2	2	1	2	3
Total	39	26	18	39	11	33	35

Table XXVI. Number of Families Consuming Selected Fats and Oils Per Week by Family Income, Sioux Falls, South Lakota, Summer, 1955

Annual Family income	Type of Fat or Oil Consumed						
	Butter	Margarine	Lard	Shortening	Cooking oils	Sandwich spreads	Salad dressings
	number of families						
Less than \$2,000	20	12	12	18	6	13	15
2,000 - 2,999	14	12	6	18	5	12	11
3,000 - 3,999	36	34	16	46	19	36	41
4,000 - 4,999	62	44	17	70	25	61	62
5,000 - 5,999	41	29	14	44	19	42	39
6,000 - 6,999	11	9	5	14	3	12	15
7,000 - 7,999	12	8	4	17	7	14	9
8,000 - 8,999	4	1	0	3	4	3	3
9,000 - 9,999	3	0	1	3	1	3	3
10,000 - over	8	5	4	9	3	10	9
Unknown	38	16	9	35	13	36	40
Total	249	170	88	277	105	242	247

Table XXVII. Total Consumption of Selected Fats and Oils Per Week by Family Income, Brookings, South Dakota, Summer, 1955

Annual Family income	Type of Fat or Oil Consumed						
	Butter	Margarine	Lard	Shortening	Cooking oils	Sandwich spreads	Salad dressings
	pounds per week						
Less than \$2,000	7.50	8.00	.0	3.40	.0	1.30	.0
2,000 - 2,999	2.50	1.50	2.00	.60	.0	.60	.60
3,000 - 3,999	18.00	12.00	2.50	11.25	2.60	4.10	4.05
4,000 - 4,999	21.00	9.60	4.30	10.60	1.85	4.85	8.30
5,000 - 5,999	5.00	2.75	1.10	3.30	.30	1.50	1.20
6,000 - 6,999	4.00	.0	.0	2.50	.0	2.50	1.20
7,000 - 7,999	1.00	2.00	.50	.50	.50	.0	.20
Unknown	3.50	.0	1.00	.70	.20	1.10	.60
Total	62.50	35.85	11.40	32.85	5.45	15.95	16.15

Table XXVIII. Total Consumption of Selected Fats and Oils Per Week by Family Income, Sioux Falls, South Dakota, Summer, 1955

Annual Family income	Type of Fat or Oil Consumed						
	Butter	Margarine	Lard	Shortening	Cooking oils	Sandwich spreads	Salad dressings
	pounds per family per week						
Less than \$2,000	17.50	8.25	6.38	10.78	1.66	4.20	4.79
2,000 - 2,999	16.75	10.83	2.70	10.96	2.08	3.05	4.98
3,000 - 3,999	45.75	42.75	10.63	38.96	10.24	18.52	24.63
4,000 - 4,999	90.00	57.75	12.50	59.67	6.40	30.31	39.27
5,000 - 5,999	62.83	33.70	9.98	43.32	4.99	19.21	23.05
6,000 - 6,999	15.50	9.25	4.33	9.58	.46	5.29	6.11
7,000 - 7,999	19.50	11.50	3.30	11.43	2.98	9.08	5.40
8,000 - 8,999	5.75	1.00	.0	2.75	1.50	1.50	1.55
9,000 - 9,999	6.00	.0	.20	2.50	.13	2.00	1.75
10,000 - over	14.00	10.00	1.50	6.33	.96	3.28	3.28
Unknown	51.75	18.75	13.13	32.98	3.61	17.39	25.53
Total	345.33	203.78	64.65	229.26	35.01	113.83	140.34

Table XXIX. Number of Consuming Units in Families Using Selected Fats and Oils by Family Income, Brookings, South Dakota, Summer, 1955

Annual Family income	Type of Fat or Oil Consumed						
	Butter	Margarine	Lard	Shortening	Cooking oils	Sandwich spreads	Salad dressings
	number of consuming units						
Less than \$2,000	7.90	6.10	.0	6.90	.0	3.60	.0
2,000 - 2,999	4.70	2.30	4.60	2.40	.0	3.70	3.70
3,000 - 3,999	23.10	26.10	7.60	30.00	6.70	22.80	21.50
4,000 - 4,999	27.90	14.65	15.50	31.40	9.55	27.85	34.10
5,000 - 5,999	7.80	6.00	3.60	6.00	4.20	7.80	7.80
6,000 - 6,999	3.10	.0	.0	3.10	.0	3.10	3.10
7,000 - 7,999	4.40	4.40	4.40	4.40	4.40	.0	4.40
Unknown	5.40	.0	3.60	3.60	1.80	3.60	5.40
Total	84.30	59.55	39.30	87.80	26.65	72.45	80.00

Table XXX. Number of Consuming Units in Families Using Selected Fats and Oils by Family Income, Sioux Falls, South Dakota, Summer, 1955

Annual Family income	Type of Fat or Oil Consumed						
	Butter	Margarine	Lard	Shortening	Cooking oils	Sandwich spreads	Salad dressings
	number of consuming units						
Less than \$2,000	24.22	17.40	13.80	23.62	9.90	18.72	20.12
2,000 - 2,999	25.80	20.85	10.15	30.35	8.65	18.90	19.30
3,000 - 3,999	81.29	81.69	41.84	103.19	47.99	89.69	99.69
4,000 - 4,999	133.01	101.54	39.20	154.24	52.20	135.17	140.22
5,000 - 5,999	94.45	71.35	34.90	99.50	47.30	103.60	93.40
6,000 - 6,999	22.35	17.20	8.75	27.25	7.00	23.90	29.50
7,000 - 7,999	29.00	16.50	9.85	39.15	18.05	32.50	22.95
8,000 - 8,999	8.50	3.80	.0	7.45	8.50	7.45	7.45
9,000 - 9,999	7.80	.0	2.80	7.80	2.40	7.80	7.80
10,000 - over	20.31	12.36	9.71	21.26	6.00	24.41	22.81
Unknown	83.15	40.25	45.55	80.00	30.35	87.00	91.50
Total	529.88	382.94	216.55	593.81	238.34	549.14	554.74

Table XXXI. Consumption of Selected Fats and Oils Per Family Per Week by Family Income
Brookings, South Dakota, Summer, 1955

Annual Family income	Type of Fat or Oil Consumed						
	Butter	Margarine	Lard	Shortening	Cooking oils	Sandwich spreads	Salad dressings
	pounds per family per week						
Less than \$2,000	1.50	2.67	.0	.85	.0	.43	.0
2,000 - 2,999	.83	.75	.67	.30	.0	.30	.30
3,000 - 3,999	2.00	1.20	.83	1.02	.87	.51	.51
4,000 - 4,999	1.75	1.37	.61	.76	.46	.40	.55
5,000 - 5,999	1.25	.92	.55	1.10	.15	.38	.30
6,000 - 6,999	2.00	.0	.0	1.25	.0	1.25	.60
7,000 - 7,999	1.00	2.00	.50	.50	.50	.0	.20
Unknown	1.17	.0	.50	.35	.20	.55	.20
Average	1.60	1.38	.63	.84	.50	.48	.46

Table XXXII. Consumption of Selected Fats and Oils Per Family Per Week by Family Income, Sioux Falls, South Dakota, Summer, 1955

Annual Family income	Type of Fat or Oil Consumed						
	Butter	Margarine	Lard	Shortening	Cooking oils	Sandwich spreads	Salad dressings
	pounds per family per week						
Less than \$2,000	.88	.69	.53	.60	.28	.32	.32
2,000 - 2,999	1.20	.90	.45	.51	.42	.25	.45
3,000 - 3,999	1.27	1.26	.66	.95	.54	.51	.60
4,000 - 4,999	1.45	1.31	.74	.85	.26	.50	.63
5,000 - 5,999	1.53	1.16	.71	.98	.26	.46	.59
6,000 - 6,999	1.41	1.03	.87	.68	.15	.44	.41
7,000 - 7,999	1.63	1.44	.83	.67	.43	.65	.60
8,000 - 8,999	1.44	1.00	.0	.92	.38	.50	.52
9,000 - 9,999	2.00	.0	.20	.83	.13	.67	.58
10,000 - over	1.75	2.00	.38	.70	.32	.33	.36
Unknown	1.36	1.17	1.46	.94	.28	.48	.64
Average	1.39	1.20	.73	.83	.33	.47	.57

Appendix C
Detailed Description of the Data

Table 1

Year	Category	Value 1	Value 2
1980	...	100	...
1981	...	105	...
1982	...	110	...
1983	...	115	...
1984	...	120	...
1985	...	125	...
1986	...	130	...
1987	...	135	...
1988	...	140	...
1989	...	145	...
1990	...	150	...
1991	...	155	...
1992	...	160	...
1993	...	165	...
1994	...	170	...
1995	...	175	...
1996	...	180	...
1997	...	185	...
1998	...	190	...
1999	...	195	...
2000	...	200	...

APPENDIX C

...

Table I. Comparative Preference of Spreads in Paired Combinations.
Brookings and Sioux Falls, 1955

Factor - Hot Breads

First Spread	Total Points	Second Spread	Total Points	Difference Between 1st and 2nd Spread
A with culture	262	A without culture	218	44
A with culture	276	B	204	72
A with culture	256	C	224	32
A with culture	305	Margarine	175	130
A without culture	261	B	219	42
A without culture	256	C	224	32
A without culture	327	Margarine	153	174
B	245	C	235	10
B	336	Margarine	144	192
C	331	Margarine	149	182
Total	2855		1945	910

Table II. Comparative Preference of Spreads in Paired Combinations
Brookings and Sioux Falls, 1955

Factor - Other Table Uses

First Spread	Total Points	Second Spread	Total Points	Difference Between 1st and 2nd Spread
A with culture	262	A without culture	218	44
A with culture	272	B	208	64
A with culture	252	C	228	24
A with culture	291	Margarine	189	102
A without culture	251	B	229	22
A without culture	256	C	224	32
A without culture	330	Margarine	150	180
B	239	C	241	-2
B	332	Margarine	148	184
C	305	Margarine	175	130
Total	2790		2110	680

Table III. Comparative Preference of Spreads in Paired Combinations
Brookings and Sioux Falls, 1955

Factor - Baked Vegetables

First Spread	Total Points	Second Spread	Total Points	Difference Between 1st and 2nd Spread
A with culture	267	A without culture	213	54
A with culture	267	B	213	54
A with culture	265	C	215	50
A with culture	281	Margarine	199	82
A without culture	251	B	229	22
A without culture	254	C	226	28
A without culture	321	Margarine	159	162
B	250	C	230	20
B	309	Margarine	171	138
C	303	Margarine	177	126
Total	2768		2032	736

Table IV. Comparative Preference of Spreads in Paired Combinations
Brookings and Sioux Falls, 1955

Factor - Seasoning				
First Spread	Total Points	Second Spread	Total Points	Difference Between 1st and 2nd Spread
A with culture	270	A without culture	210	60
A with culture	264	B	216	48
A with culture	258	C	222	36
A with culture	290	Margarine	190	100
A without culture	241	B	239	2
A without culture	239	C	241	-2
A without culture	327	Margarine	153	174
B	239	C	241	-2
B	311	Margarine	169	142
C	303	Margarine	177	126
Total	2742		2058	684

Table V. Comparative Preference of Spreads in Paired Combinations
Brookings and Sioux Falls, 1955

Factor - Frying				
First Spread	Total Points	Second Spread	Total Points	Difference Between 1st and 2nd Spread
A with culture	270	A without culture	210	60
A with culture	266	B	214	52
A with culture	252	C	228	24
A with culture	282	Margarine	198	84
A without culture	245	B	235	10
A without culture	250	C	230	20
A without culture	305	Margarine	175	130
B	253	C	227	26
B	291	Margarine	189	102
C	280	Margarine	200	80
Total	2694		2106	588

Table VI. Comparative Preference of Spreads in Paired Combinations
Brookings and Sioux Falls, 1955

Factor - Baking

First Spread	Total Points	Second Spread	Total Points	Difference Between 1st and 2nd Spread
A with culture	263	A without culture	217	46
A with culture	263	B	217	46
A with culture	248	C	232	16
A with culture	274	Margarine	206	68
A without culture	249	B	231	18
A without culture	244	C	236	8
A without culture	284	Margarine	196	88
B	249	C	231	18
B	290	Margarine	190	100
C	278	Margarine	202	76
Total	2642		2158	484

Table VII. Comparative Preference of Spreads in Paired Combinations
Brookings and Sioux Falls, 1955

Factor - Overall Flavor

First Spread	Total Points	Second Spread	Total Points	Difference Between 1st and 2nd Spread
A with culture	271	A without culture	209	62
A with culture	275	B	205	70
A with culture	260	C	220	40
A with culture	308	Margarine	172	136
A without culture	249	B	231	18
A without culture	247	C	233	14
A without culture	323	Margarine	157	166
B	256	C	224	32
B	325	Margarine	155	170
C	307	Margarine	173	134
Total	2821		1979	842

Table VIII. Comparative Preference of Spreads in Paired Combinations
Brookings and Sioux Falls, 1955

Factor - Saltiness

First Spread	Total Points	Second Spread	Total Points	Difference Between 1st and 2nd Spread
A with culture	264	A without culture	216	48
A with culture	263	B	217	46
A with culture	239	C	241	-2
A with culture	282	Margarine	198	84
A without culture	243	B	237	6
A without culture	224	C	256	-32
A without culture	298	Margarine	182	116
B	243	C	237	6
B	309	Margarine	171	138
C	282	Margarine	198	84
Total	2647		2153	494

Table IX. Comparative Preference of Spreads in Faired Combinations
Brookings and Sioux Falls, 1955

Factor - Spreadability

First Spread	Total Points	Second Spread	Total Points	Difference Between 1st and 2nd Spread
A with culture	273	A without culture	207	66
A with culture	254	B	226	28
A with culture	248	C	232	16
A with culture	303	Margarine	177	126
A without culture	240	B	240	0
A without culture	242	C	238	4
A without culture	337	Margarine	143	194
B	239	C	241	-2
B	334	Margarine	146	188
C	319	Margarine	161	158
Total	2789		2011	778

Table X. Comparative Preference of Spreads in Paired Combinations
Brookings and Sioux Falls, 1955

Factor - Texture

First Spread	Total Points	Second Spread	Total Points	Difference Between 1st and 2nd Spread
A with culture	258	A without culture	222	36
A with culture	244	B	236	8
A with culture	255	C	225	30
A with culture	259	Margarine	221	38
A without culture	235	B	245	-10
A without culture	246	C	234	12
A without culture	283	Margarine	197	86
B	246	C	234	12
B	282	Margarine	198	84
C	288	Margarine	192	96
Total	2596		2204	392

Table XI. Comparative Preference of Spreads in Paired Combinations
Brookings and Sioux Falls, 1955

Factor - Appearance

First Spread	Total Points	Second Spread	Total Points	Difference Between 1st and 2nd Spread
A with culture	262	A without culture	218	44
A with culture	245	B	235	10
A with culture	247	C	233	14
A with culture	316	Margarine	164	152
A without culture	230	B	250	-20
A without culture	225	C	255	-30
A without culture	332	Margarine	148	184
B	238	C	242	-4
B	326	Margarine	154	172
C	312	Margarine	168	144
Total	2733		2067	666

Table XII. Comparative Preference of Spreads in Paired Combinations
Brookings and Sioux Falls, 1955

Factor - Characteristic Flavor

First Spread	Total Points	Second Spread	Total Points	Difference Between 1st and 2nd Spread
A with culture	314	A without culture	284	30
A with culture	319	B	273	46
A with culture	285	C	262	23
A with culture	303	Margarine	228	75
A without culture	305	B	298	7
A without culture	294	C	263	31
A without culture	340	Margarine	203	137
B	289	C	280	9
B	318	Margarine	226	92
C	275	Margarine	213	62
Total	3042		2530	512

Table XIII. Comparative Preference of Spreads in Paired Combinations
Brookings and Sioux Falls, 1955

Factor - Characteristic Texture

First Spread	Total Points	Second Spread	Total Points	Difference Between 1st and 2nd Spread
A with culture	318	A without culture	287	31
A with culture	320	B	291	29
A with culture	300	C	295	5
A with culture	299	Margarine	232	67
A without culture	292	B	301	-9
A without culture	292	C	297	-5
A without culture	347	Margarine	210	137
B	291	C	300	-9
B	319	Margarine	215	104
C	299	Margarine	233	66
Total	3077		2661	416

Table XIV. Comparative Preference of Spreads in Paired Combinations
Brookings and Sioux Falls, 1955

Factor - Characteristic Spreadability

First Spread	Total Points	Second Spread	Total Points	Difference Between 1st and 2nd Spread
A with culture	330	A without culture	287	43
A with culture	325	B	309	16
A with culture	300	C	307	-7
A with culture	321	Margarine	240	81
A without culture	301	B	303	-2
A without culture	315	C	312	3
A without culture	354	Margarine	235	119
B	285	C	290	-5
B	336	Margarine	228	108
C	331	Margarine	235	96
Total	3198		2746	452

Table XV. Comparative Preference of Spreads in Paired Combinations
Brookings and Sioux Falls, 1955

Factor - Characteristic Melting Point

First Spread	Total Points	Second Spread	Total Points	Difference Between 1st and 2nd Spread
A with culture	310	A without culture	295	15
A with culture	299	B	289	10
A with culture	290	C	286	4
A with culture	294	Margarine	243	51
A without culture	299	B	294	5
A without culture	293	C	300	-7
A without culture	319	Margarine	237	82
B	279	C	273	6
B	308	Margarine	237	71
C	307	Margarine	242	65
Total	2998		2696	302

Table XVI. Comparative Preference of Spreads in Paired Combinations
Brookings and Sioux Falls, 1955

Factor - Characteristic Color

First Spread	Total Points	Second Spread	Total Points	Difference Between 1st and 2nd Spread
A with culture	307	A without culture	293	14
A with culture	312	B	296	16
A with culture	287	C	285	2
A with culture	336	Margarine	232	4
A without culture	305	B	307	-2
A without culture	318	C	312	6
A without culture	346	Margarine	223	123
B	293	C	290	3
B	325	Margarine	222	103
C	323	Margarine	220	103
Total	3152		2680	472

APPENDIX D

SOUTH DAKOTA STATE COLLEGE
 Agricultural Experiment Station
 Agricultural Economics and Dairy Husbandry Departments
 College Station, South Dakota

Survey of Consumer Preferences For Butter
 CONFIDENTIAL

- I. Code number: _____ Enumerator _____
- A. 1st selection _____ C. 3rd selection _____ Date _____
- B. 2nd selection _____ D. ___th selection _____ Respondent _____

- II. Personal data:
- | | Husband | Wife |
|------------------------------|---------|-------|
| A. State (country) of birth | _____ | _____ |
| B. National origin | _____ | _____ |
| C. Occupation | _____ | _____ |
| D. Rural or urban background | _____ | _____ |
| E. Religious preference | _____ | _____ |

- III. Family characteristics:
- | Person | Age | C.U. | Meals Out
(per week) | A.C.U. |
|------------|-------|-------|-------------------------|--------|
| A. Husband | _____ | _____ | _____ | _____ |
| B. Wife | _____ | _____ | _____ | _____ |
| C. _____ | _____ | _____ | _____ | _____ |
| D. _____ | _____ | _____ | _____ | _____ |
| E. _____ | _____ | _____ | _____ | _____ |
| F. _____ | _____ | _____ | _____ | _____ |
| G. _____ | _____ | _____ | _____ | _____ |
| H. _____ | _____ | _____ | _____ | _____ |

- IV. Financial Status:
- A. Own home _____ Rent _____ Other (specify) _____

B. Annual family income:

- | | |
|----------------------------|-------------------------|
| 1. Less than \$2,000 _____ | 6. 6,000 - 6,999 _____ |
| 2. 2,000 - 2,999 _____ | 7. 7,000 - 7,999 _____ |
| 3. 3,000 - 3,999 _____ | 8. 8,000 - 8,999 _____ |
| 4. 4,000 - 4,999 _____ | 9. 9,000 - 9,999 _____ |
| 5. 5,000 - 5,999 _____ | 10. 10,000 & over _____ |

V. Fats and oils consumption: (per week)

Type	Total	Table	Baking	Frying	Vegetables	Salads	Others
	(lbs.)						
A. Butter	_____	_____	_____	_____	_____	_____	_____
B. Margarine	_____	_____	_____	_____	_____	_____	_____
C. Lard	_____	_____	_____	_____	_____	_____	_____
D. Shortening	_____	_____	_____	_____	_____	_____	_____
E. Oils	_____	_____	_____	_____	_____	_____	_____
F. Spreads	_____	_____	_____	_____	_____	_____	_____
G. Salad Dressings	_____	_____	_____	_____	_____	_____	_____

VI. Which is better for*

	Butter	Margarine	Lard	Shortening	Oils
A. Taste	_____	_____	_____	_____	_____
B. Appearance	_____	_____	_____	_____	_____
C. Spreadability	_____	_____	_____	_____	_____
D. Keeping quality	_____	_____	_____	_____	_____
E. Nutrition	_____	_____	_____	_____	_____
F. Dieting	_____	_____	_____	_____	_____
G. Toast and hot breads	_____	_____	_____	_____	_____
H. Other table use	_____	_____	_____	_____	_____
I. Sandwiches	_____	_____	_____	_____	_____

	Butter	Margarine	Lard	Shortening	Oils
J. Seasoning	_____	_____	_____	_____	_____
K. Baking	_____	_____	_____	_____	_____
L. Frying	_____	_____	_____	_____	_____
M. _____	_____	_____	_____	_____	_____
N. _____	_____	_____	_____	_____	_____

*(D = definite preference; W = weak preference; N = no preference; U = do not know; encircle factor considered by the consumer to be most important reason for buying butter or margarine.)

VI. Willing to participate in consumer panel _____

SOUTH DAKOTA STATE COLLEGE
 Agricultural Experiment Station
 Agricultural Economics and Dairy Husbandry Department
 College Station, South Dakota

Panel Study of Consumer Preferences for Butter

A. Group No. _____ D. Code No. _____
 B. Family No. _____ E. Date completed _____
 C. Week No. _____ F. Respondent: H _____ W _____

I. (Indicate which spread you prefer and how much you prefer it for each of the following uses or reasons.)

(Indicate preference with check mark in the proper column.)

<u>Uses and Reasons</u>	SPREAD NO. _____		SPREAD NO. _____		NEI- THER
	slight	defi- nite	slight	defi- nite	
A. Hot breads (rolls, toast, etc.)					
B. Other table uses (cold bread, sandwiches, etc.)					
C. Baked vegetables (potatoes, squash, etc.)					
D. Seasoning (mashed potatoes, corn peas, etc.)					
E. Frying (eggs, steak, etc.)					
F. Baking (cakes, rolls, pies, etc.)					
G. Overall flavor					
H. Saltiness					
I. Spreadability (ease of spreading on bread.)					
J. Texture (waxy, oily, crumbly, gummy, etc.)					
K. Appearance (color)					
L. _____					
M. _____					

