

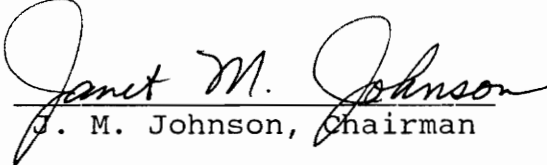
THE NUTRITIONAL QUALITY OF THE DIET OF  
18TH CENTURY MORAVIANS (1775 - 1800) IN  
SALEM, NORTH CAROLINA: A COMPARISON  
OF PRESENT DIETARY TRENDS

by

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## ABSTRACT

History can be used as a way of studying the nutritional adequacy of past diets. The Moravians of Salem, North Carolina, were the focus of this study. Various documents were examined to gather information on the crops grown, foods eaten and daily lifestyle. Seasonal diets (spring, summer, fall, winter) were reconstructed and computer analyzed for nutritional content. The results were compared to the twentieth century data for Southern U.S. residents from the 1987-88 Nationwide Food Consumption Survey (NFCS) provided by the Human Nutrition Information Service of the USDA. Both data sets were compared to the RDA for females ages 19 - 24 years old.

Overall, the Moravian diets contained high amounts of animal products, bread, fruits and vegetables. Significant differences between the diet of 1775 and 1987 data were indicated for the following nutrients: kilocalories, carbohydrate, fat, saturated fat, cholesterol, riboflavin, calcium, phosphorus and iron. The Moravian diet was below 100 percent of the RDA for: vitamin B6, vitamin C, vitamin E, calcium, and magnesium. Carbohydrates, cholesterol, vitamin B6, vitamin E, calcium, phosphorus, magnesium, iron and zinc were the nutrients below 100 percent of the RDA for the 1987 data. The Moravian diet seemed more balanced than the 1987 data. Perhaps the Moravians practiced a few of the guidelines taught in current nutrition education. Fresh fruits and

vegetables and moderate alcohol consumption were common to the diet. In addition, activity levels were higher due to the lifestyle of early America. The results indicate that history can be a learning tool for nutritionists in predicting trends for the future.

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## CHAPTER 1 - INTRODUCTION

History is a way of examining our heritage, values, attitudes and traditions. Food is a common thread that links the past to the present. The passage of recipes and techniques from generation to generation is a way of preserving our heritage and remembering the past. A historical study of foods provides a knowledge base for the understanding of the origins of food behaviors, values and attitudes.

Historical studies provide a learning tool for the present. By looking at the past centuries, a study of the diets of the people can determine the sources of food behaviors. The food behaviors may have developed because of location, weather conditions, outside influences, customs or religious practices. Analysis of past practices can benefit the present and prevent future problems.

History serves as the basis to study trends in food. Trends from the past can be used to account for present trends and even predict trends for the future. Knowing what happened in the past can help societies adapt for the future through nutrition education or further research. For example, history has already taught researchers about the importance of vitamin C and the prevention of scurvy, niacin intake and incidences

of pellagra and the relationship between iodine and goiters (National Research Council, 1989).

The understanding of food, its preparation and consumption has changed over the centuries. There was a time when all food was thought to be the focal point to survival and acquired through hunting and gathering. Prior to 1900, much time was spent collecting and searching for food. When food supplies were low, starvation occurred. Revolutionary changes have occurred in the twentieth century. Today, entire stores are devoted to the purchasing of food. Magazines, television shows and cookbooks also focus entirely on food. An array of restaurants offer basic to gourmet in the quick service to upscale service format.

Historical research has not dealt with the nutritional status of residents in the various early American settlements. Historians have considered how food was grown, prepared and preserved but not the nutritional adequacy of the diets. Therefore, research needs to be conducted so that the professionals who portray the early history can do so in a more authentic manner. Also, the information gained will assist in understanding how the settlers adapted to their new environment.

Comparing the effects of Moravian seasonal diets on their nutritional status may assist with examining current diets. Today's diets may be basically similar to the

Moravians' diet in that the food has been treated or preserved. Many current foods are precooked, processed and treated with preservatives for added storage life, just as earlier foods were. For example, beef, pork, chicken and turkey are processed into sausages, frankfurters, bacon and luncheon meats that contain sodium and nitrites as preservatives. Consumers can purchase entrees that require no refrigeration and are stored in the kitchen cabinet and heated in minutes in the microwave. There is a vast array of frozen dinners, snack foods and canned fruits and vegetables that contain some type of additive or preservative.

When applied to the present, studying the past in an era of food as basic survival will allow nutritionists to understand the weaknesses and strengths of today's diets where food is in more abundance. Perhaps trends of the eighteenth century can be seen in the diets of individuals and families of the twentieth century.

The purpose of this research was to study the diet of the late 18th century Moravians in Salem, North Carolina and determine the nutritional adequacy. The selection of this settlement for study was based on the location and choir system. Because the settlement is located in the backcountry of North Carolina, imports and the English influence were not as evident as in the coastal regions of Virginia and North Carolina. The limited imports of sugar, molasses, spices,

coffee, tea and chocolate were received from Charleston, Petersburg and Pennsylvania. Therefore, this research was an example of the settlers of German ancestry living on the frontier.

The hypothesis of the study was that the diet of the 18th century Moravians in Salem, North Carolina was nutritionally balanced and adequate for their lifestyle. The consumption of fruits and vegetables, grains, milk products and meats are documented in the sources. Many of the same fruits and vegetables are consumed today. Preparation of a variety of foods was explained in the various cookbooks and receipts (recipes) from the time period (Moss and Hoffman, 1985). Fresh foods were eaten whenever possible. The remainder were preserved in order to assure a food supply for the winter months. An understanding of the importance of good taste and presentation can be summed up in a quote from a cookbook author: "Most people spoil garden things by over-boiling them. All things that are green should have a little crispness, for if they are over-boiled, they neither have sweetness or beauty" (Hannah Glasse, 1747, Moss and Hoffman, 1985).

## OBJECTIVES

The objectives of this research were:

1. To use history as a learning tool in examining past food consumption patterns.
2. To use food habits as a basis in predicting and recommending present dietary needs and patterns.
3. To study food consumption patterns of the late 18th century Moravians as a comparison to the nutrient intake of 20th century Southern U.S. residents.

## CHAPTER 2 - REVIEW OF LITERATURE

The Moravians that settled in the backcountry of North Carolina moved from Bethlehem, Pennsylvania in 1752. The purpose of the migration was to establish a settlement that would provide income for the community and to build the *gemein Ort* (common place). Land was purchased and named the Wachovia Tract. The settlement of Bethabara was begun in November 1753. As this town grew, there was a need to establish a farming community. Bethania became the farming community for the Moravians in 1759 (Dept of Education and Interpretation).

In January of 1766, a site was selected for the construction of the *gemein Ort*. The settlement was named Salem and construction continued for seven years until the spring of 1772 when the first residents occupied quarters (Thorp, 1989). The town was the trade and craft center of the Wachovia Tract.

### MORAVIAN RELIGION

The Unitas Fratrum (Unity of Brethren) or Moravians have a religion that has been influenced by other religious groups throughout history. During the Lutheran Reformation, Moravians were drawn to Calvinism but during the 18th century Lutheran Pietism influenced the religion. The Lutheran influence still continues but has been modified somewhat

(Weinlick and Frank, 1989). The doctrine of the church is the following: "The Holy Scriptures of both the Old and New Testament are and abide the only source and rule of faith, doctrine, and life of the Unitas Fratrum" (Weinlick and Frank, 1989). The church also recognizes the word of the cross as the center of the Holy Scriptures and of all the preaching of the Gospel. Bearing witness to this message is the mission of the Unitas Fratrum. The church does not have a sound doctrine; therefore, it is in continual search of a doctrine. The reason is that "the mystery of Jesus Christ which is attested to in the Bible cannot be comprehended completely by any human statement" (Weinlick and Frank, 1989). The spirit of the church can be characterized by simplicity, happiness, unintrusiveness and fellowship (Shawe, 1979).

A Moravian worship service today is very similar to other Protestant churches. Hymns are sung but as a chorale type. Both the Communion service and Lovefeast place an emphasis on fellowship (Weinlick and Frank, 1989). They are served to the congregation in the pews by the ministers or members of the congregation. The Lovefeast is a song service during which a simple meal is served. The rule for the food served is that it must be very simple and easily distributed (Fries, 1973). The drink could be coffee, tea or lemonade and is served in mugs. The bread is usually a slightly sweetened bun and is served in baskets that are passed down the pews (Fries, 1973).

Traditionally, sweet buns and coffee prepared with sugar and cream were consumed. Often, if coffee was not available, beer or whiskey was served as the beverage. The Lovefeast is the only celebration that has any relationship to food. Unlike other religions, the Moravians did not have any forbidden foods; therefore religion did not have any influence on dietary habits.

#### GOVERNMENT

The Moravian church was very much in control of its brothers and sisters of the congregation. The leadership of the Moravian religion and community was comprised of four boards. The *Aeltesten Conferenz* (Elders Conference) was in charge of the spiritual affairs of the community. It was composed of ordained ministers and their wives along with the women who had oversight of the Sisters' and Widows' choirs. The *Aufsher Collegium* (*Business Board*) directed the community about material affairs such as trades, professions and commerce. The membership included one married and two single brothers who were elected by the Congregation Council in addition to the Curator of the Single Sisters choir, the *Vorsteher* (Business Manager) of the Single Brothers choir and the community *Vorsteher*. The third board was the Greater Helpers Conference. Its purpose was to be the "eyes" for the town and bring any problems to the attention of the proper



leaders or board. Membership consisted of members from the Elders Conference and Business Board, the physician, the main church sextons, the itinerant minister, the sicknurse and night watchman. The *Community Council* dealt with the civic improvements of the town. This was the largest group because members were all the communicant members of the congregation (Old Salem Restoration Library, 1990). All of the boards were responsible to the central Church government located in Germany.

The church leaders could ask the brothers and sisters individually to grant them the authority to determine their residence, who they would marry, what job they would hold, and how to raise their children (Thorp, 1989).

### ECONOMY

The *Oeconomy* was the basis for the economy prior to 1772. It was semi-communal in structure. The brothers and sisters were given food, housing, clothing, medical care, and education for themselves and their families in exchange for labor (Thorp, 1989). The idea behind the economy was that the church leaders wanted to protect the residents from the "worldly problems that so often threaten families" (Thorp, 1989).

Once Salem was established, the economic structure of the

Moravians changed. Salem was a congregation town and the church owned all the land within a three-mile radius (Surratt, 1975). Individuals leased lots from the church on a yearly basis. The houses were built and owned by the individuals; however, the plans required approval prior to construction (Surratt, 1975).

Community businesses included a store, tavern, tanyard and pottery. These businesses were owned by the community but operated by salaried individuals (Surratt, 1975). Privately owned and operated trades consisted of baking, shoemaking, tailoring and smithying (Surratt, 1975). Competition was limited by the church leaders so that each individual could earn a living. Each business had a monopoly on its field as long as the community needs were met (Surratt, 1975).

#### CHOIR SYSTEM

The residents in Salem were organized into choirs. Choirs were based on age, sex and marital status (Hammond, 1989). Choir groups present in Salem were widows, married people, Single Brothers, Single Sisters, older boys, older girls, little boys and little girls. Single Brothers, Single Sisters and Widows choirs lived separately from the married couples of the town (Fries, 1973). This separation extended to working and relaxation as well (Surratt, 1975). Selection of marriage partners was conducted by the church governing

boards and decided by lot (Hammond, 1989). The lifestyles of the Moravians were comfortable and not extravagant. The housing was dry and provided protection from the Indians. Clothing was sturdy and clean. There were no rules governing dress except it should be simple. Following current fashion was viewed as "an improper attempt to attract attention" and was disfavored. Women did wear a *haube* to church services. The white linen cap was tied with a colored ribbon which indicated to which choir the wearer belonged (Fries, 1973).

#### COMMUNITY HEALTH

The Moravians may have been ahead of their time when community health was considered. The selection of the site for Salem was an example. Leaders wanted the elevation of the town to be sufficient to prevent flooding of the surrounding fields. This was believed to be a factor in the outbreaks of fever each fall in Bethabara (Moore, 1969). The Moravians designed a water system that carried water directly into major buildings. The system was in place by 1778 and insured a "sufficient and constant supply of water."

A physician was always available to Salem residents. In addition, members were selected from each choir to be sick-nurses. Sickrooms were established in the Single Brothers and Single Sisters houses. Medicinal gardens were planted and an

apothecary shop were opened in Bethabara in 1763 (Moore, 1969).

A positive outcome of the community health system was the longevity of the residents. Reports were made that some residents celebrated birthdays of 72, 80, 76, 84, and 61 years (Salem Diary, Fries, (vol. 5 - 6), 1968).

### FOODS OF SALEM

Being of German ancestry, many of their customs and traditions were carried from the homeland to Pennsylvania to North Carolina. This is most evident in the foods that were grown and their preparation and preservation.

Vegetables grown in Wachovia prior to the Revolution included asparagus, beans, beets, cabbages, carrots, cauliflower, celery, cucumbers, squash, turnips, kohlrabi, mangel, onions, parsnips, field peas, sweet peas, Irish potatoes, sweet potatoes, pumpkin, radishes and a variety of salad greens (Christian Gottlieb Reuter, 1764, Fries, (vol. 2), 1968). Bread was an important part of the German diet (Gehris, 1985). Corn and wheat were grown for this purpose with wheat being the primary source of flour.

The sources of meat included wild game, poultry, cattle, cattle and hogs. The amount of meat eaten depended on the season of the year. Hot weather restricted the butchering of large animals; however, the opposite was true in the winter

months (Bowser, 1992). This is evident in the warning of a Moravian leader about the consumption of too much pork. "It is unhealthy in hot regions. Who knows where the great sickness in Virginia and Carolina comes from. Perhaps there are other reasons, But the great amount of pork eaten contributes to it" (Spangenberg, 1756, Thorp, 1982).

Fruit was also common in the Moravian settlement. Over 1,800 apple, peach, cherry and apricot trees were planted in Bethabara in the first five years of its establishment (Inventory of fruit trees planted in Bethabara, 1758, Thorp, 1982). Moss and Hoffman (1985) gave evidence that pumpkins and wild berries were consumed.

Butter was available and used to prepare recipes. The communal kitchen in Bethabara from January 17, 1758 indicate that butter was used in ordinary porridge (2 1/2 lbs), dumplings (6 lbs), with beans (3 1/4 lbs) and at the table (6 lbs) (Conference Minutes, 1758, Fries, (vol. 1), 1968).

Foods were eaten fresh when in season and preserved for the months ahead. The Moravians used many preserved foods in their diet. One of the oldest and most simple ways of preserving food was dehydration (Gehris, 1985). Foods were either placed on planks or threaded on string to dry in the sun. Sometimes an additional step was to place the food in the oven after the day's baking had been completed (Moss and Hoffman, 1985) Dry houses were also built and used (Bethania

Diary, 1782, Fries, (vol. 4), 1968). Typical dried foods included apples, peaches, berries, mushrooms, pumpkins, beans, peas, peppers and corn (Moss and Hoffman, 1985 and Gehris, 1985).

Vegetables were either stored in cold storage or pickled. The cold storage was very different from the cold storage of today. The vegetables were placed in a cold cellar or in a pit for longer storage time (Gehris, 1985). The vegetables and fruits that were typically stored included potatoes, beets, turnips, carrots, onions, pumpkins, winter squash, cabbage and apples (Gehris, 1985). Pickling vegetables in a mixture of salt, vinegar and water was another way Moravians preserved foods. The most common vegetable that was pickled was cabbage or sauerkraut as it is called after curing (Gehris, 1985). Cucumbers, radishes and French beans were also pickled (Moss and Hoffman, 1985). The salting and curing of meat was very common in Salem. Hams, bacon, and sausages were cured and usually smoked to help extend the storage time (Bowser, 1992). Other preservation methods included covering vegetables in melted fat and cooking fruit in sugar to make preserves.

Spices were used to give the preserved foods flavor. In addition, a spice might have been added to a spoiled food to mask the off-flavor (Bowser, 1992). The common spices were nutmeg, mace, cloves, cinnamon, ginger, allspice, white and

black pepper, cardamom, and caraway seeds. The spices were highly valued since they were imported (Bowser, 1992). Herbs of all types were grown and gathered from the surrounding area. Not only were the herbs used for cooking but many had a medicinal purpose as well.

Trade letters document other imports from Charleston, South Carolina. These included coffee, tea, chocolate, sugar, molasses, rice, wine, herring and oranges (Fries, 1968). Coffee and tea were commonly drunk at breakfast and, occasionally chocolate at supper (Moss and Hoffman, 1985). Sugar was in the form of a loaf or brown sugar. Usually honey, molasses, maple sugar or maple syrup served as a sweetener (Moss and Hoffman, 1985).

Packaging has greatly changed since the 18th century. When preserving foods in stoneware, the methods of closure could have included pouring a layer of oil or fat on top of the food, stretching a bladder across the jar top and tying with string or tying a leather cover on the jar. Sometimes all methods might have been used (Moss and Hoffman, 1985). Today, foods can be packaged in vacuum packaging, modified atmosphere, heat and serve containers, plastic bags, aluminum pouches, cans, boxes and bottles. Food technology has advanced so much that food can be processed so that it will survive for years.

## MEALS

In 1758, meals in Bethabara were still prepared in a communal kitchen and the congregation ate meals together. Accounts from the Conference Minutes of January 1758 indicated the following meal preparation (Fries, (vol. 2), 1968):

Week of January 10 - 15th  
Tuesday - meat - 60 lbs, - and carrots  
Wednesday - sausage and dried pumpkins  
Thursday - dumplings  
Friday - pigs' feet and heads, and turnips  
Sabbath or Sunday - beans and butter  
\* no account for Monday

January 16, 1758

We decided that 60 lbs. meat is not enough to cook. Today we had meat and dried pumpkins.

Tuesday - dumplings with radish  
Wednesday - meat and turnips  
Thursday - dumplings with radish  
Friday - meat and carrots  
Saturday - meat and sauerkraut  
Sunday - beans and butter

The amount of meat was increased to 70 pounds which would allow three pounds of meat per person per week (Moore, 1969). The meals above were served at noon and were the main meal of the day (Moss and Hoffman, 1985). The meals for a day were similar to those stated in a January 19, 1758 account (Bethabara Diary, 1758, Fries, (vol. 2), 1968):

In the morning porridge, according to the weather; during the morning, brandy;  
At noon as already planned, or as may be decided;  
For vesper barley-coffee, or sometimes brandy, or if the work is very hard a little beer;  
Evening, usually porridge for some, bread and milk for others.



In addition, extra butter was given to certain residents outside of meal time. The selected Brethren were:

"the night-watchman, the herdsman, the Bush-Ranger sometimes, the threshers, and sometimes carpenters. When the Brethren have unusually hard work they will get butter at vesper. The Sisters with children need half a pound of butter per week; the herdsman a quarter pound each per week; the grubbers half a pound" (Bethabara Diary, 1758, Fries, (vol. 2), 1968).

Additional records from Bethabara in 1764-65 indicate that the residents consumed per person per week on average of 6.4 pounds of flour, 3.8 pounds of meat, 0.8 pounds of butter, and 0.5 gallons of beer and unrecorded quantities of vegetables, fruit and milk. If a family had children, the milk ration was doubled (Thorp, 1989). The Moravians had all of the basic necessities, food, shelter and clothing. The details of their lifestyle are described in the diaries and documents that were carefully kept. The records serve as the basis for the understanding of this group of people and how their culture developed.

#### HISTORICAL RESEARCH

Historical research is not common in the area of foods and nutrition. Margo and Steckel (1982) researched the heights of American slaves to see the effects of nutrition and health. Historical records were examined and regression analysis was conducted in order to indicate the variation in adult heights across the different groups and over time. Kopp

(1986) was interested in the dietary changes of the Navajo Indians from the earliest times to the 1980's. The paper describes both the changes in dietary patterns and the nutritional status and the relative nutritive value of their foods. The data were collected from the writings of soldiers, missionaries and traders, anthropological studies that included interviews with elders of the 1800's and early 1900's, nutritional studies, and from the extrapolation of past patterns. The patterns were based on the study of the continuation of traditional ways (Kopp, 1986). General patterns of food consumption were restructured and the changes were considered in the response to social, economic and environmental changes (Kopp, 1986).

Spencer (1982) developed a methodology for historical research in her dissertation Food in Seventeenth - Century Tidewater Virginia, A Method for Studying Historical Cuisines. This document was used as a guideline for the methodology of this research. The historical sources examined were primarily documentary records. The sources of documentary records included cookbooks, tavern inventories, store records, reference files and other printed and archival materials (Spencer, 1982).

## CHAPTER 3 - METHODOLOGY

Residents in the Moravian settlement of Salem, North Carolina were the focus of this research. The specific group examined was the Single Sisters choir. The selection was determined by the amount of available documented data. Records from the years 1775 - 1800 were examined.

The selection of the Moravians is based on the fact that they kept excellent records. The Moravian records contained autobiographies of residents, inventories of buildings, ledger sheets, and minutes of the governing bodies (Thorp, 1989). Salem was a congregational town. The land was leased from the church by individuals. Homes and some businesses were privately owned. Even the Single Brothers and Single Sisters choirs followed the same practice.

### CATEGORIES EXAMINED

The categories that were examined and used in the documentation of this study are the following:

#### RESIDENTS

Origination

Ethnic Background

Religion

## POLITICAL CONTEXT

Government

Degree of autonomy or independence of people in making decisions relating to food

Economic structure and conditions

## PHYSICAL CONTEXT

Climate

Quality of farmland

Natural resources

Variations in seasonal climate

Crops grown

Livestock

## FOODS EATEN

Meat and poultry

Fish

Wild game

Grains

Vegetables

Fruits

Dairy products

Fats and oils

Beverages

Sweeteners

Seasonings

(Spencer, 1982).

## DATA COLLECTION

The documentary records examined by Spencer (1982) were cookbooks, tavern inventories, store records, reference files and other printed archival materials. The amount of data collected was enormous; however, there was much more data that could have been reviewed. Therefore, some sources may have not been used or considered because there must be a point at which collection stops and analysis begins. The documents examined for this research were primarily the following: *Records of the Moravians in North Carolina (vol. 2 - 6)*, Old Salem Restoration Library Reference Files and various documents located in the Moravian Archives, Winston-Salem, NC.

From the data collected, a one week dietary recall was restructured from each season of the year (fall, winter, spring, summer). The diet was evaluated by the Nutritionist III computer program (N<sub>2</sub> Computing, Silverton, Oregon) to analyze the RDA of the food eaten. Data for the twentieth century were selected from the 1987-88 Nationwide Food Consumption Survey (NFCS) provided by the Human Nutrition Information Service of the United States Department of Agriculture (USDA, 1987-88). The geographical area chosen was the Southern United States. The only comparable age group to that of the Single Sisters choir available was the 20 to 39 year old age group. Recommended Dietary Allowances (RDA) (1990) for both time periods were compared to determine

differences, similarities and deficiencies.

The problem that occurs with historical research is that it is not possible to remove the documents from their location. A method was developed to allow for the most efficient way of recording the data. A portion of the Moravian records has been translated and are available in library volumes. Reference file materials were photocopied and kept for later evaluation. Information from a few documents was recorded on the form in Figure 1. The form allowed for the recording of the biographic information, author, location of the document, identifying numbers, dates and notes about the document (Spencer, 1982). The majority of the data was recorded in a word processing program and later accessed through a word search. This method was faster and more adaptable to the large volume of data collected. Information was finally organized by categories on poster board for each season and year examined. Data for each season could be viewed at one time which assisted with the reconstruction of the seasonal diets.

#### SEASONAL DIET DETERMINATION

The diets of the Single Sisters were constructed from accounts about food in the *Records of the Moravians* and other sources. The amounts were based on Thorp's (1982) research and Fries (1968) account of January 1758. (See review of

literature). The diets were only an estimate of what the Moravians actually may have eaten.

The ages of the Single Sisters were difficult to determine. Sparks (1974) mentions that "along about the age 18, the unwed girls changed their ribbons to pink." A pink ribbon signified the Single Sisters choir. Because of the apprentice program used in Salem, boys were approximately 21 years old before being allowed to marry. Therefore, the Single Sisters were probably approximately the same age. The RDA for females ages 19 - 24 years was selected for the computer analysis.

### Statistical Analysis

Analysis of Variance (ANOVA) (SAS, 1990) was used for statistical analysis to determine differences between the nutrients in the diets of 1775 and 1987.

AUTHOR \_\_\_\_\_  
TITLE \_\_\_\_\_  
DOCUMENT TYPE \_\_\_\_\_  
IDENTIFICATION NUMBERS/ CALL NUMBER \_\_\_\_\_  
LOCATION OF DOCUMENT \_\_\_\_\_  
DATE OF DOCUMENT \_\_\_\_\_ PAGES \_\_\_\_\_  
DESCRIPTION OF DOCUMENT \_\_\_\_\_  
\_\_\_\_\_  
DATA NOTATIONS

Figure 1. Data collection form used for examining documents.



## CHAPTER 4 - FINDINGS

### Limitations of the Study

The Moravians kept detailed records in German. These records are handwritten in old German and few have been translated. Therefore, previously translated documents were the basis of this research even though limited in number. The foods eaten were recorded but there were no records stating the portion size at a single meal. Estimates of the amounts were used for the nutritional analysis.

Another limitation was determining the activity level of the residents. Accounts were kept of the activities performed, but everyone performed multiple tasks. For example, some of the activities of the Single Sisters were laundry, teaching school, gardening and making candles. Modern conveniences were not available; therefore, the work was much more strenuous and time consuming.

The time period studied included events that impacted the results. The Revolutionary War occurred from 1776 until 1783 which was during the years examined. The Moravians remained neutral and did not fight in the war. They did provide food and supplies to the British and American soldiers which sometimes created strains on the residents. Extra meat, cornmeal, flour and alcohol were needed by the troops. When possible, the demands were divided among the three towns:

Bethania, Bethabara and Salem.

The time period also influenced the accounts written in the documents. Prior to 1772, the residents of Bethabara were more communal. The meals were prepared in a central kitchen. During 1775-1800 in Salem, most meals were prepared in individual homes of which there are few accounts recorded. The exceptions were the choir houses where communal living continued. Accounts were used from Bethabara and Bethania as well as Salem since the previous towns supplied food to Salem and interacted often.

#### TOWN FACILITIES

Salem was the central business town of the Moravian settlement. Bethabara and Bethania were the agricultural support to the community. However, there were several farms that also belonged to the residents of Salem. There were the Salem, Stockburger, Single Brothers and Single Sisters farms (Salem Diary, 1775 - 1800, Fries, (vol. 2 - 6), 1968).

Located in Salem were the businesses and craftsmen. The Single Brethren operated a slaughterhouse and a bakery. A distillery was present, along with a community store and a tavern. Gardens were included in each house lot and at each choir house.

Residents and the choirs purchased any foods that they could not provide in sufficient quantities. The community

store offered coffee, tea, sugar, chocolate and spices for sale. Bread could be bought at the bakery. Milk and butter were brought into town from the surrounding farms and purchased (Minutes of Salem Boards, 1781, Fries, (vol. 4), 1968). Fresh meat was provided by the slaughterhouse and surrounding farms ( Salem Diary, 1790, Fries, (vol. 5), 1968).

#### SEASONAL FARM WORK AND FOOD PRESERVATION

The Moravians observed the seasons at times similar to the twentieth century. The Moravians wrote that on March 21, 1779, "spring began with an usually rainy day." Summer was reported beginning on June 21, 1779. Fall was documented, according to the calendar, as beginning with the fall equinox on September 22, 1779. No specific date was stated as the beginning of winter (Fries, (vol. 3), 1968) but December 21st was used for this research. From the *Records of the Moravians* (Fries, (vol. 2 - 6), 1968), an overview of the seasonal farm work and its relationship to food preservation was established. (Table 1)

In addition to the listed activities, routine activities included: brewing beer, working and harvesting gardens and baking bread (Fries, (vol. 2 - 6), 1968).

Daily life changed somewhat according to the seasons.

TABLE 1 - Seasonal Farm Work and Food Preservation

Season	Farm Work	Food Preservation
Spring	sowed oats planted corn ploughed, hoed corn harvest rye, barley plant gardens	grind wheat
Summer	harvest wheat sow turnip seed gather wild grapes gather apples, peaches thresh grain	dry apples, peaches take apples, peaches to still-house press apples for cider preserve vegetables/ fruits
Fall	sow rye, wheat, barley harvest corn gather hops harvest turnips  gather apples	press apples for cider store vegetables in cellars preserve vegetables/ fruits
Winter	kill hogs, cattle thresh grains plant fruit trees	

This was mainly due to the amount of work required in the fields and gardens in the summer. An example was the following:

April 1, 1776 - "According to the summer schedule breakfast was at 7 o'clock; at sunset the bell rang for stopping work; after supper about 7 o'clock, there was the twilight service and the singstunde at the usual hour . . ." (Salem Diary, 1777, Fries, (vol. 3), 1968).

School and weekday services were also dropped during the harvest seasons. Winter hours began at the beginning of October and but no details were mentioned (Salem Diary, 1781, Fries, (vol. 4), 1968).

#### CROPS GROWN

Wheat was grown as the "chief bread crop" and rye was seldom or never raised. Corn and tobacco were considered the real or cash farm crops (Salem Diary, 1792, Fries, (vol. 5), 1968). Barley, oats and buckwheat were also grown. At times, the Moravians could not produce enough grains for their demands and would purchase them elsewhere.

#### LIVESTOCK

Cattle, oxen and hogs were slaughtered for meat. Accounts stated that they were given free range and roamed in the woods. Fences had to be constructed to keep the animals out of the gardens and fields. Sheep were mainly raised for the wool. Chickens, geese and guineas were also mentioned.

## MEAT AND POULTRY

There were more accounts about slaughtering livestock in the fall and winter seasons. The Single Brothers operated the slaughterhouse. Hogs were expected to weigh at least 170 pounds (Bethabara Diary, 1776, Fries, (vol. 3), 1968). Cattle and oxen were also slaughtered and processed. Smokehouses were owned by the Single Brethren, Single Sisters and another town resident. The smokehouses were often misused or not managed properly. Accounts stated that the meat had an oily taste because oil barrels were store in the smokehouse. The Single Sisters' smokehouse was reported as having rats and spoiled meat (Salem Board Minutes, 1788, Fries, (vol 5) 1968).

Eggs were only mentioned in that they were stored in a springhouse. Their use was not stated (Bethabara Diary, 1781, Fries, (vol.4), 1968).

## FISH AND WILD GAME

Very few accounts were recorded about fish and wild game. Fish were sold but no type was mentioned. The Yadkin river was reported as swarming with fish. The types were "shott-fish, rock-fish, pike, perch, eels, white-fish and crawfish" (Christian Gottlieb Reuter, 1764, Fries, (vol. 2), 1968). Hunting was allowed except from mid-February until fall (Salem Board Minutes, 1798, Fries, (vol. 6), 1968). Venison may have been eaten since the trading of deer skins was conducted by

the Moravians. Other wildlife in the area that was eaten included: turkey, bear, rabbit, raccoon, duck, and partridges (Christian Gottlieb Reuter, 1764, Fries, (vol. 2), 1968).

### GRAINS

The grain crops were cut and then threshed in the sheds usually during the fall or winter. Wheat and corn were ground into flour and meal at the town mill. The flour was used in baking bread. The loaf size was recorded as approximately 3 pounds (Salem Board Minutes, 1775, Fries, (vol. 2), 1968). A regulation was to give 1 pound of bread for 1 pound of flour. This was used in trading with residents and other customers (Salem Board Minutes, 1800, Fries, (vol. 6), 1968). To increase trade, the Moravians installed a bolter to produce merchant flour. When wheat was in short supply and expensive, bread was made by mixing the flour with corn meal to keep the loaf size the same (Salem Board Minutes, 1795, Fries, (vol. 6), 1968). Granaries were used as storage facilities and at times the grain was stored in homes to hide it from soldiers during the Revolutionary War (Salem Board Minutes, 1780, Fries, (vol. 4), 1968).

## VEGETABLES

Each household grew produce. The vegetables known to grow in the area were: asparagus, beans, beets, cabbage, red cabbage, carrots, cauliflower, celery, cress, cucumbers, endive, kohlrabi, leeks, lettuce, onions, parsnips, peas, potatoes, sweet potatoes, pumpkins, radishes, spinach and turnips (Christian Gottlieb Reuter, 1764, Fries, (vol. 2), 1968). Produce was accepted as payment for rent or other goods (Salem Board Minutes, 1785, Fries, (vol. 5), 1968). During the late spring and early summer (approximately May 8th to July 5th), salad days were common with families since fresh vegetables were readily available (Jakob).

## FRUITS

The major fruit crops grown were apples and peaches. These fruits were dried or made into brandy. The apples were also pressed into cider and some were stored whole (Bethabara Diary, 1780, Fries, (vol. 4), 1968). The apple and peach crops varied each year depending on the weather. The spring frost killed the blossoms or a dry summer made the fruit small sized (Fries, (vol. 2 - 6), 1968). Other fruits grown were apricots, cherries, currents, gooseberries, grapes, pears, quince, muskmelons, strawberries and watermelons (Christian Gottlieb Reuter, 1764, Fries, (vol. 2), 1968).



## DAIRY PRODUCTS

The only dairy products recorded were milk and butter. Milk was provided from the farms surrounding Salem. There was never a very steady supply especially in the winter. The price of milk rose from November first until the end of March because the price of feed for the cattle increased (Salem Board Minutes, 1787, Fries, (vol. 5), 1968). Unlike the beef cattle, the dairy cattle were less likely to roam freely. The milk production from a cow was much lower than expected today. About 2 quarts a day was the yield from a cow during the Revolutionary War period. Milk was consumed once a day in October, every other day in November and then every third day in the following months (Jakob).

## FATS AND OILS

Butter was the primary fat used in the diet. It was mentioned that a cask of fish oil was purchased but its use was not stated (Salem Diary, 1776, Fries, (vol. 3), 1968). Bear fat was sometimes used as a dressing on a salad (Moss and Hoffman, 1985). Fat was used to cover the lids of jars when preserving meat and sometimes vegetables. Vegetables were placed in fat as a method of preservation.

## BEVERAGES AND ALCOHOL

There was a large selection of beverages served. Coffee, tea and chocolate were imported. Cider, wine and brandy were made from the fruits gathered each year. The Single Brothers operated a brewery and beer was an important beverage for children and adults. Different strengths were brewed for the children (Jakob). A distillery was also operated in the community which made whiskey sold at the tavern and to the community (Fries, (vol. 2 - 6), 1968).

## SWEETENERS

The sweeteners used were sugar, molasses and honey. Sugar was used carefully since it was expensive. Both sugar and molasses were imported (Archives Papers, 1784, Fries, (vol. 5), 1968). An attempt was made to produce molasses from corn stalks in Bethabara but there were not enough stalks available (Bethabara Diary, 1783, Fries, (vol. 5), 1968). Bee hives were located in Salem for honey production. Dried fruits were also used to sweeten cakes, breads and puddings (Jakob).

## SEASONINGS

Salt was used not only as a seasoning but as a preservative as well. Meats were salted and brine was made for sauerkraut and pickled vegetables. Salt was scarce especially during the Revolutionary War (Salem Diary, 1777, Fries, (vol. 3), 1968). Spices listed in the inventory of the Bethabara store in 1805 (Moravian Archives, Winston-Salem) included: cinnamon, nutmeg, cloves, ginger, allspice, salt and pepper.

## DESCRIPTION OF THE SINGLE SISTERS CHOIR

The Single Sisters were an important part of the Salem community. Their population during the time period examined were 14 to 29 females (Fries, (vol. 2 - 6), 1968). Basically the Sisters were expected to have occupations or businesses that produced a profit for the choir. Occupations of the Single Sisters and Older Girls in 1786 included: teaching, knitting and sewing, house and field work, working in a family, housecleaning, and working in the kitchen (Catalog of the Single Sisters and Older Girls, 1786, Fries, (vol. 5), 1968). Further accounts were made about the Single Sisters making gloves, cleaning the Saal, shearing sheep, haying, pulling flax, cooking, baking and washing clothes for money (Fries, (vol. 2 - 6), 1968).

The expenses of a Single Sister were the following: rent, board, cleaning, oil and lights, water, Congregation Saal expense, Congregation cash, room cash, Unity contribution and Lovefeast expense. A pre-determined balance was paid by each Sister every four weeks (Salem Board Minutes, 1790, Fries, (vol. 5), 1968).

In 1785, construction began on a new choir house for the Single Sisters. The property included space for a weave-house, wash house, smoke house and stable. The garden was 190 feet wide and the orchard contained 2 3/4 acres (Minutes of Salem Boards, 1787, Fries, (vol. 5), 1968). Vaulted cellars were located in the house along with a kitchen equipped with a small roasting oven and cooking oven with three kettles (used for keeping food warm) (Minutes of Salem Boards, 1786, Fries, (vol. 5), 1968).

Like the other Moravians, the Single Sisters were good record keepers; however, many of the records are not translated. Table 2 lists the foods mentioned in the ledger of the Single Sisters for the kitchen during 1786 and 1787 (Moravian Archives, Winston-Salem).

TABLE 2 - Food Mention in Single Sisters Ledger  
for the Kitchen (1786 and 1787)

meat  
fish  
butter  
bran  
rice  
beer  
cow - branding of cow \* purchased cow  
salt  
coffee  
potatoes  
hens  
milk  
sugar  
bread  
flour  
chocolate  
beans

Another source of information was the records of the Salem tavern as similar foods and supplies would have been kept there, although the amounts would have been greater. The tavern inventory of April 30, 1791 included the following food items:

830 lb dried hog meat  
100 lb butter  
100 lb hog lard  
14 bushels salt  
130 lb coffee  
200 lb sugar  
Tea and chocolate  
40 lb ginger  
40 lb potash \* used for leavening  
35 bu wheat  
700 lb meal  
120 bu corn  
275 bu oats

60 gal West India rum  
170 gal North Rum  
64 gal wine  
360 gal rye brandy  
230 peach brandy  
70 g molasses  
32 g cider  
2 barrels strong beer  
1 barrel small beer  
6 gal sherry  
(Old Salem Restoration Library, 1990).

## CHAPTER 5 - RESULTS AND DISCUSSION

The reconstructed seasonal diets of the Single Sisters for one week are included in Tables 3 - 6. There is representation from the four food groups and nutrients. The serving sizes of foods in the diets are estimates based on Thorp since few amounts of food eaten were recorded. These diets illustrate a basic understanding of the foods eaten during the 25 year time period. Any diet could have included desserts, different meats, beverages and vegetables. Nutrient analysis for each season can be compared in Figures 2A - 2G.

### COMPARISON BY YEARS

For statistical purposes, the diets were analyzed as one diet and compared to the 1987 data. Significant differences were indicated for kilocalories, carbohydrate, fat, saturated fat, cholesterol, riboflavin, calcium, phosphorus and iron (Figures 3A - 3D).

Overall, a Single Sister consumed more calories per day than a female in 1987 (Figure 3D). This was an estimate and varied depending on the season (Figure 2G). The kilocalories were comprised mainly of carbohydrates for both years (46% 1775, 47.4% 1987). Not knowing the foods eaten for the 1987 data will limit the discussion to the foods of the 1775 diet. The 1775 diet sources of carbohydrates were bread, brandy,

ale, fruits and vegetables and grain. The influence of dieting and the media could have been a contributing factor to the lower number of kilocalories consumed by 1987 females. The "thin look" is very popular in the United States, especially with women in their late teens and early twenties.

The consumption of animal products caused the amount of fat (Figure 3A), saturated fat (Figure 3A) and cholesterol (Figure 3C) to be higher in the 1775 diet. Beef, pork, lamb, milk, eggs and butter were a large portion of the Moravian diet. Percentage of kilocalories from fat was 34.4% for 1775 and 36.4% for 1987. However, the percentage of saturated fat was higher for the 1775 diet (15.5%) than the 1987 diet (12.9%). The lower 1987 percentage could be contributed to the increased awareness and education about the relationship between saturated fat and cholesterol and the development of cardiovascular disease. This is further seen in the higher percentages of monounsaturated (12.9 (1987) 12.3 (1775) (Figure 3A) and polyunsaturated fats (7.1 (1987) 3.3 (1775) (Figure 3A).

The only water soluble vitamin with a significant difference was riboflavin (Figure 3B). Riboflavin is found in meats, fish, poultry, dairy products and dark green vegetables (National Research Council, 1989) which were contained in the 1775. The lower amount for the 1987 diet could be contributed to the caloric intake of the foods high in riboflavin.



Females may tend to eat less meat and dairy products because of the fat content. Another source of the vitamin available to the 1987 females and not the Moravians was enriched and fortified flour, bread, cereals and bakery products.

The calcium intake (Figure 3D) of the Moravians was surprisingly high considering the variability of milk with the seasons. Milk was consumed on a varied schedule from October until March (Jakob; Fries, 1968). Leafy green vegetables such as spinach could be considered as an alternate source, Other possible sources of calcium were beer, eggs and sauerkraut. Perhaps an explanation of the low 1987 consumption of calcium could be related to the wide selection of beverages in the U.S. Soft drinks are as common as milk in refrigerators. The age group (20 - 39 years) may believe that since they are not in the teen years and growing, that they do not need to drink milk anymore.

Phosphorus intake (Figure 3D) was higher for the 1775 diet. Protein-rich foods and cereal grains are sources of this nutrient (National Research Council, 1989). Once again, the animal products in the Moravian diet were the contributors.

The iron value (Figure 3C) was higher for the 1775 diet. Meat and eggs were found to be the major contributors to the source of iron in the Moravian diet. However, the 1987 value should seem to be higher because fortified cereal products are

an important source in today's diets (National Research Council, 1989). The 1987 females could be prone to anemia because they are in their reproductive years. Approximately 5 to 14 percent of the females ages 15 to 44 have an anemic condition (National Research Council, 1989).

TABLE 3 - Foods Available in the Summer Months 1775 - 1800  
in the Moravian Community with Estimated Portions

FOOD ITEM	SERVING SIZE	AMOUNT(gms)
Apple, raw, peeled	3.0 Items	384.0
Cherries, sweet, raw	20.0 Items	136.0
Lemon, raw, unpeeled	1.0 Item	108.0
Peaches, raw, whole	3.0 Items	261.0
Beets, sliced, boil	1.0 Cup	170.0
Cabbage, common, boil	1.0 Cup	145.0
Onions, young green	2.0 Items	10.0
Spinach, raw, chopped	2.0 Cups	112.0
Egg, whole, raw, large	5.0 Items	250.0
*Fish, trout, rainbow, cooked, dry	1.0 Item	85.0
*Milk, whole, 3.3% fat	1.5 Quarts	1464.0
*Butter, regular, stick	0.8 Pound	363.0
Sugar, white, granulated	1.0 Cup	192.0
Salt, table salt	1.0 Cup	264.0
*Bread, white, soft	7.0 Pounds	3175.0
*Beef, lean/fat, simmer, roast	2.0 Pounds	907.0
Carrots, boil, sliced	1.0 Cup	156.0
Melons, cantaloupe, raw	1.0 Cup	160.0
Beans, snap, green, boil	2.0 Cups	250.0
Cucumber, raw, whole	2.0 Items	602.0
Lettuce, looseleaf, raw	4.0 Cups	220.0
*Brandy-California	6.0 Items (30 gm each)	180.0
*Ale Mild American	0.5 Gallon	1840.0
Coffee, Brewed	7.0 Cups	1658.0

\* adapted to Nutritionist III

TABLE 4 - Foods Available in the Fall Months 1775 - 1800  
in the Moravian Community with Estimated Portions

FOOD ITEM	SERVING SIZE	AMOUNT (gm)
*Lamb, shoulder, lean/ fat, roast	0.2 Pound	90.72
*Pork, loin, lean/fat roast	1.0 Pound	454.0
Apple, raw, peeled	2.0 Items	256.0
Lemon, raw, unpeeled	1.0 Item	108.0
Cucumber, raw, whole	1.0 Item	301.0
Pumpkin, boil, drain, mashed	2.0 Cups	490.0
Cabbage, common, boil	1.0 Cup	145.0
Potato, boil, peel	5.0 Items	675.0
Turnips, boil, diced	2.0 Cups	312.0
*Milk, whole, 3.3% fat	1.0 Quart	976.0
*Butter, regular, stick	0.75 Pound	340.0
Egg, whole, raw, large	5.0 Items	250.0
Salt, table salt	1.0 Cup	264.0
Cider, fermented	0.5 Gallon	920.0
Sugar, white, granulated	1.0 Cup	192.0
Beans, snap, green, boil	1.0 Cup	125.0
Onions, mature, boil	1.0 Cup	210.0
*Brandy, California	6.0 Items (30 gm each)	180.0
*Ale, mild, American	0.5 Gallon	1840.0
Coffee, brewed	7.0 Cups	1658.0
Lettuce, looseleaf, raw	2.0 Cups	110.0
Carrots, boil, sliced	1.0 Cups	156.0
*Bread, white, soft	7.0 Pounds	3175.0

\* adapted to Nutritionist III

TABLE 5 - Foods Available in the Winter Months 1775 - 1800  
in the Moravian Community with Estimated Portions

FOOD ITEM	SERVING SIZE	AMOUNT (gms)
*Brandy, California	6.0 Items (30 gm each)	180.0
*Ale, mild, American	0.5 Gallon	1840.0
Coffee, brewed	7.0 Cups	1658.0
*Pork, loin, lean, fat, roast	2.0 Pounds	907.0
Lemon, raw, unpeeled	1.0 Item	108.0
Pumpkin, boil, drain, mashed	2.0 Cups	490.0
Potato, boil, peel	5.0 Items	675.0
Turnips, boil, diced	2.0 Cups	312.0
*Milk, whole, 3.3% fat	0.5 Quart	488.0
*Butter, regular, stick	0.5 Pound	227.0
Egg, whole, raw, large	5.0 Items	250.0
Salt, table salt	2.0 Cups	528.0
Cider, fermented	0.5 Gallon	1920.0
Sugar, white, granulated	1.0 Cup	192.0
Apples, dehyd, ckd	2.0 Cups	386.0
Peaches, dried, cooked, unsweetened	1.0 Cup	259.0
*Ginger bread, mix	2.0 Servings	91.4
Sauerkraut, canned	2.0 Cups	472.0
Sweet potato, boil, mashed	1.0 Cup	328.0
*Bread, white, soft	7.0 Pounds	3175.0
*Beef, lean/fat, simmer, roast	1.0 Pound	454.0
Carrots, boil, sliced	1.0 Cup	156.0
Onions, mature, boil	1.0 Cup	210.0
Parsnips, sliced, boil drain	1.0 Cup	156.0

\* adapted to Nutritionist III

TABLE 6 - Foods Available in the Spring Months 1775 - 1800  
in the Moravian Community with Estimated Portions

FOOD ITEM	SERVING SIZE	AMOUNT (gms)
*Ginger bread, mix	2.0 Servings	91.4
Beans, snap, green, boil	2.0 Cups	250.0
Cucumber, raw, whole	2.0 Items	602.0
Lettuce, looseleaf, raw	4.0 Cups	220.0
Radishes, raw	10.0 Items	45.0
Peas, green, raw boiled	0.25 Pound	113.0
Lemon, raw, unpeeled	1.0 Item	108.0
*Brandy-California	6.0 Items (30 gm each)	180.0
*Ale Mild American	0.5 Gallon	1840.0
Coffee, Brewed	7.0 Cups	1658.0
*Milk, whole, 3.3% fat	1.5 Quarts	1464.0
*Butter, regular, stick	0.75 Pound	340.0
Egg, whole, raw, large	5.0 Items	250.0
Salt, table salt	1.0 Cups	264.0
*Fish, trout, rainbow, cooked, dry	1.0 Serving	85.0
Sugar, white, granulated	1.0 Cup	384.0
*Bread, white, soft	7.0 Pounds	3175.0
*Beef, lean/fat, simmer, roast	2.0 Pounds	907.0

\* adapted to Nutritionist III

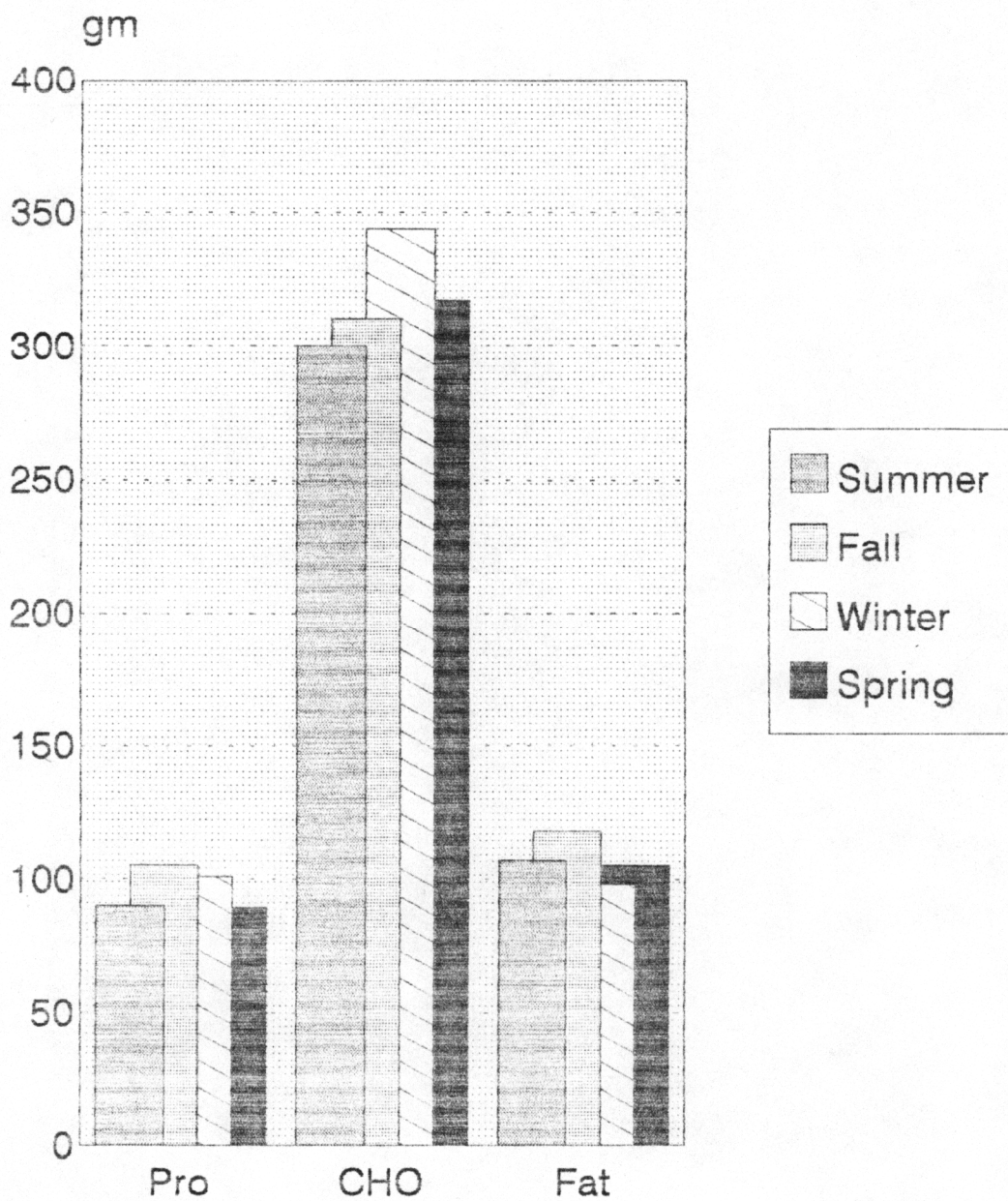


FIGURE 2A - The comparison of nutrients by season for 1775.

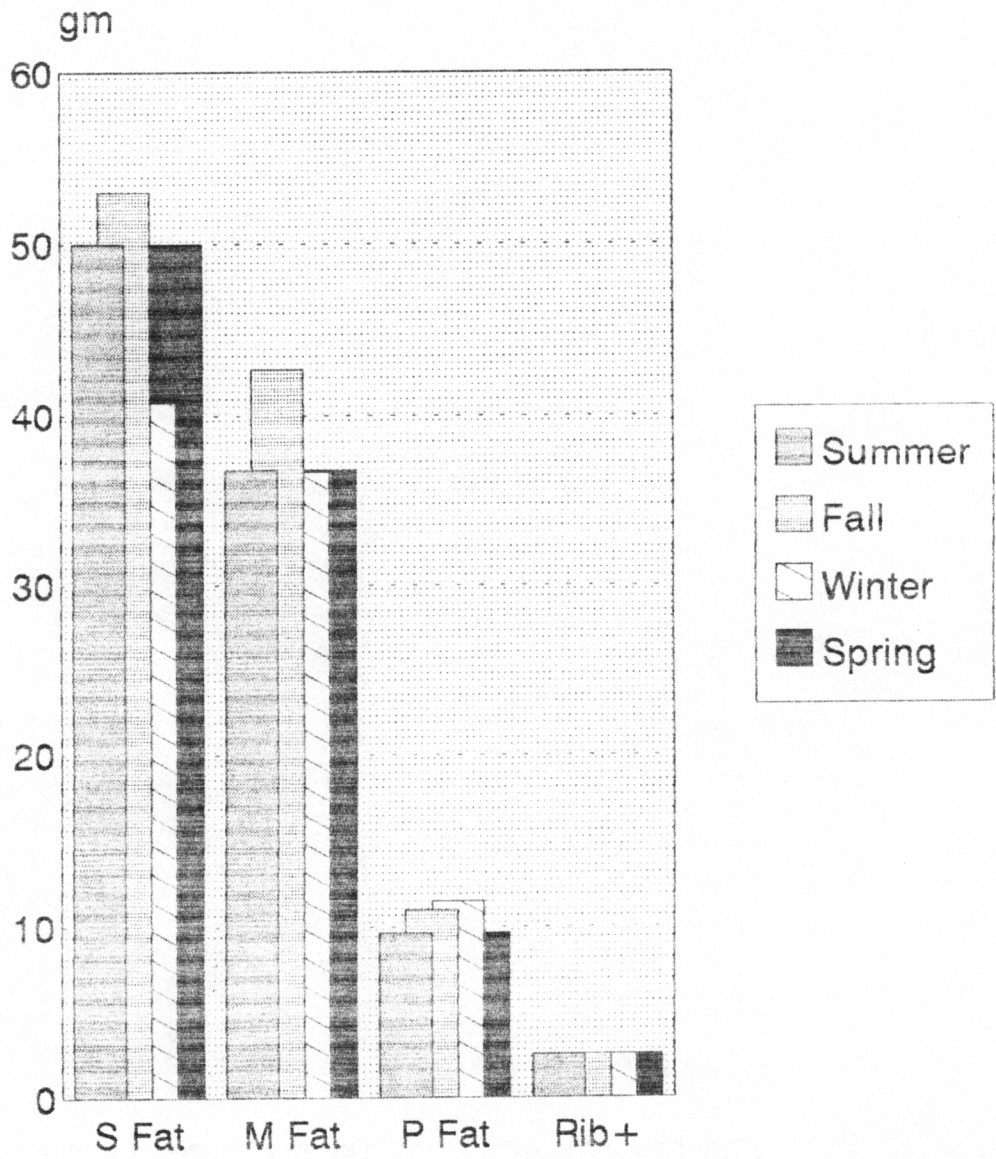


FIGURE 2B - The comparison of nutrients by season for 1775.  
 + units in mg



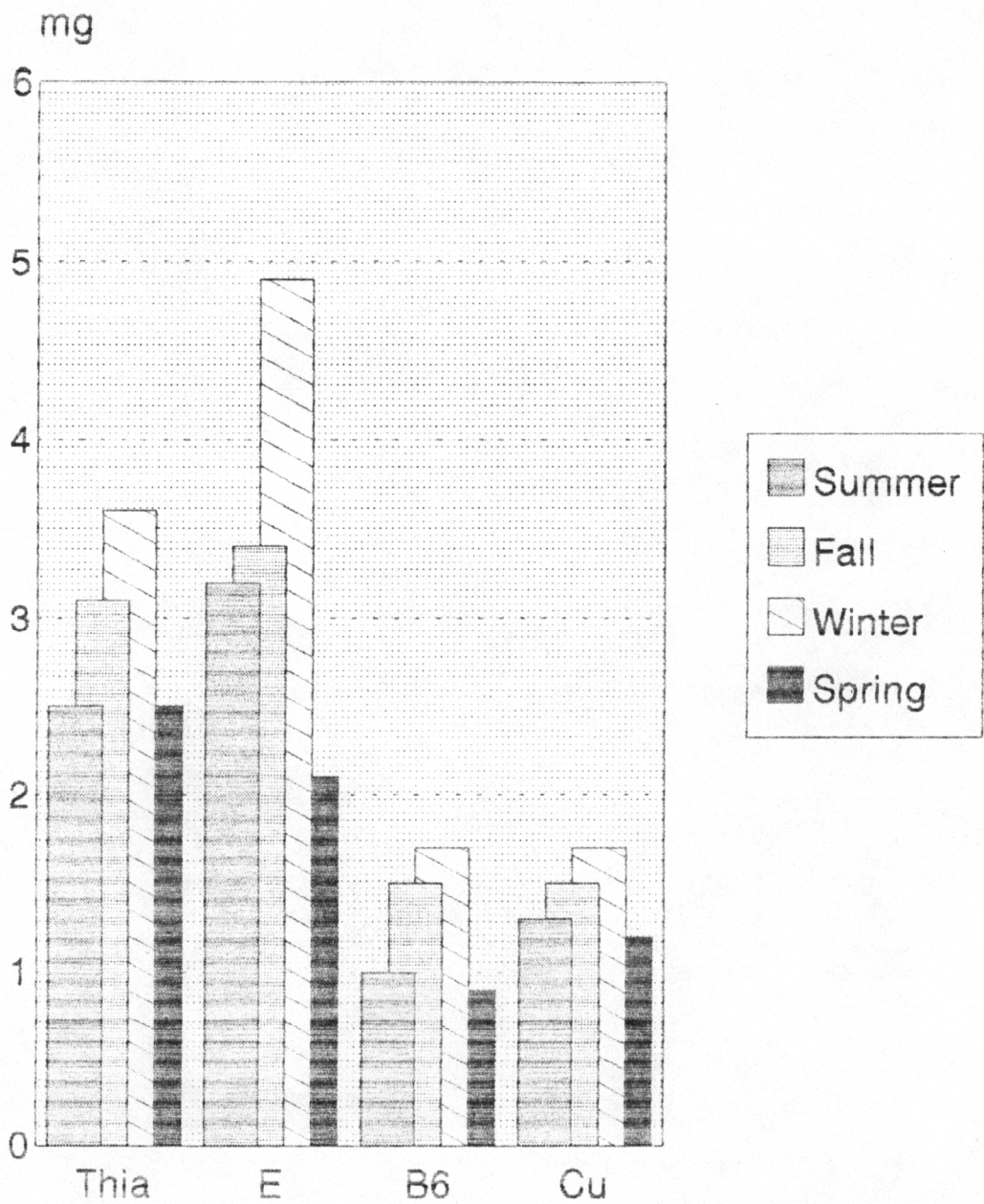


FIGURE 2C - The comparison of nutrients by season for 1775.

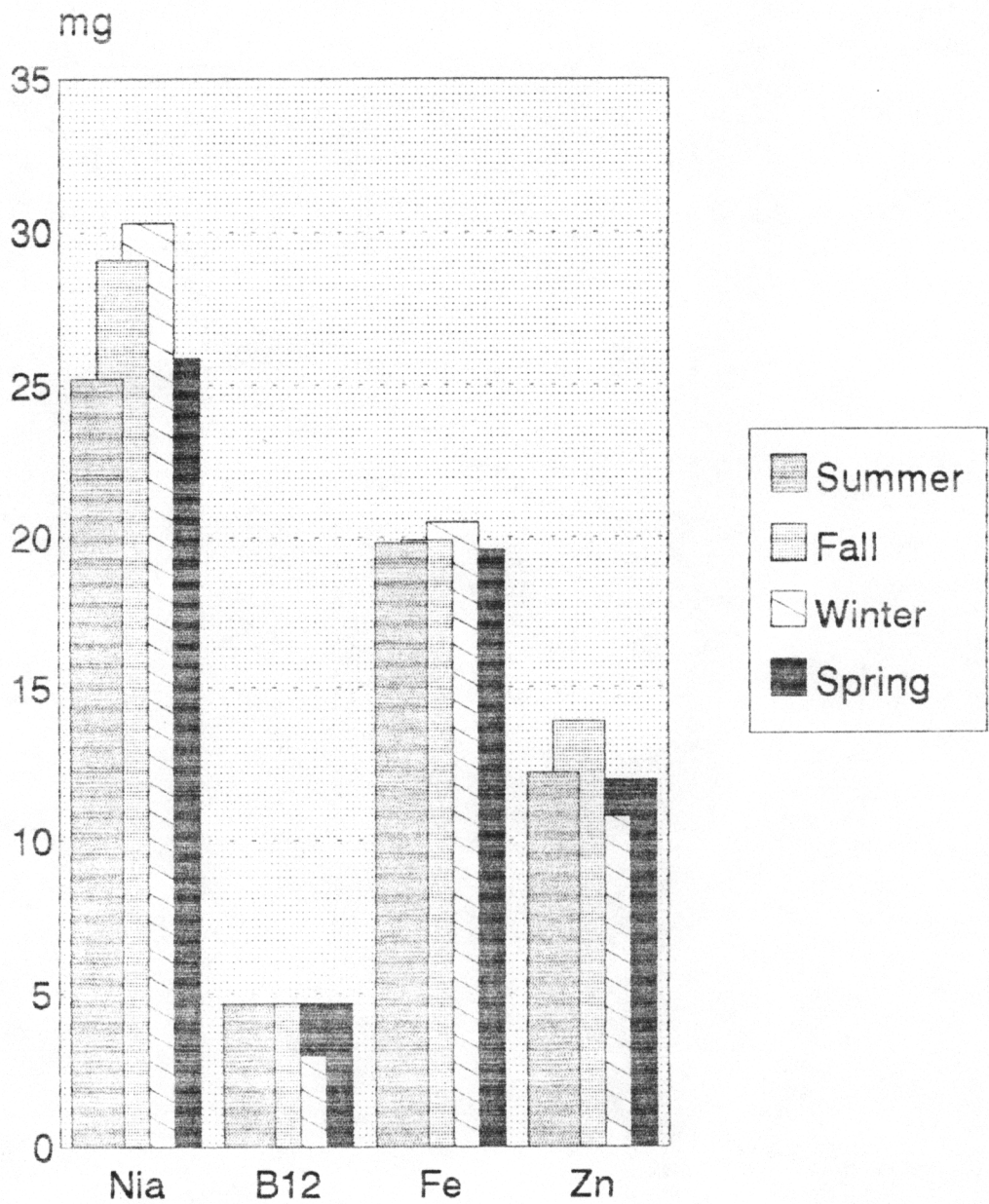


FIGURE 2D - The comparison of nutrients by season for 1775.

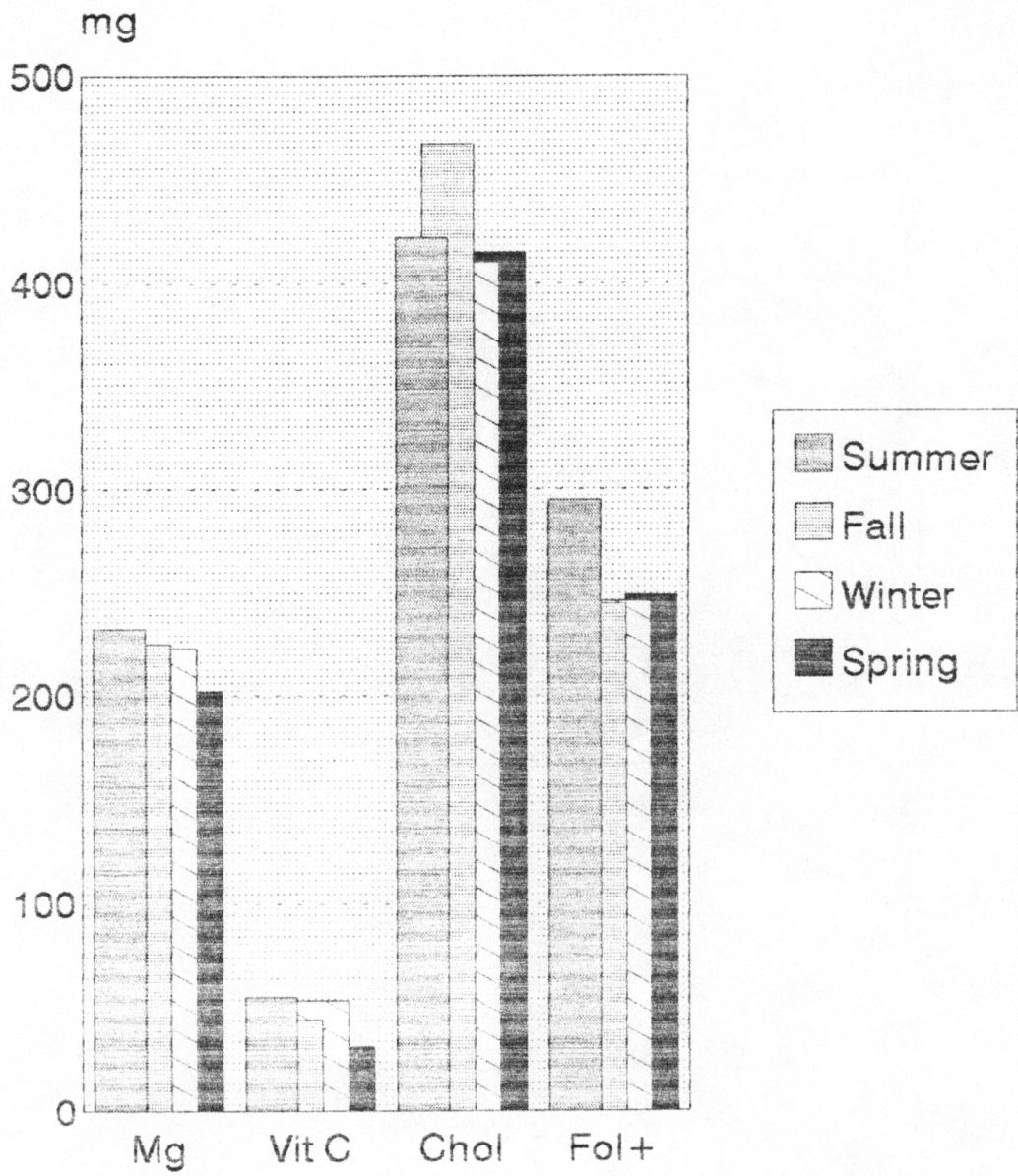


FIGURE 2E - The comparison of nutrients by season for 1775.  
 + units in ug

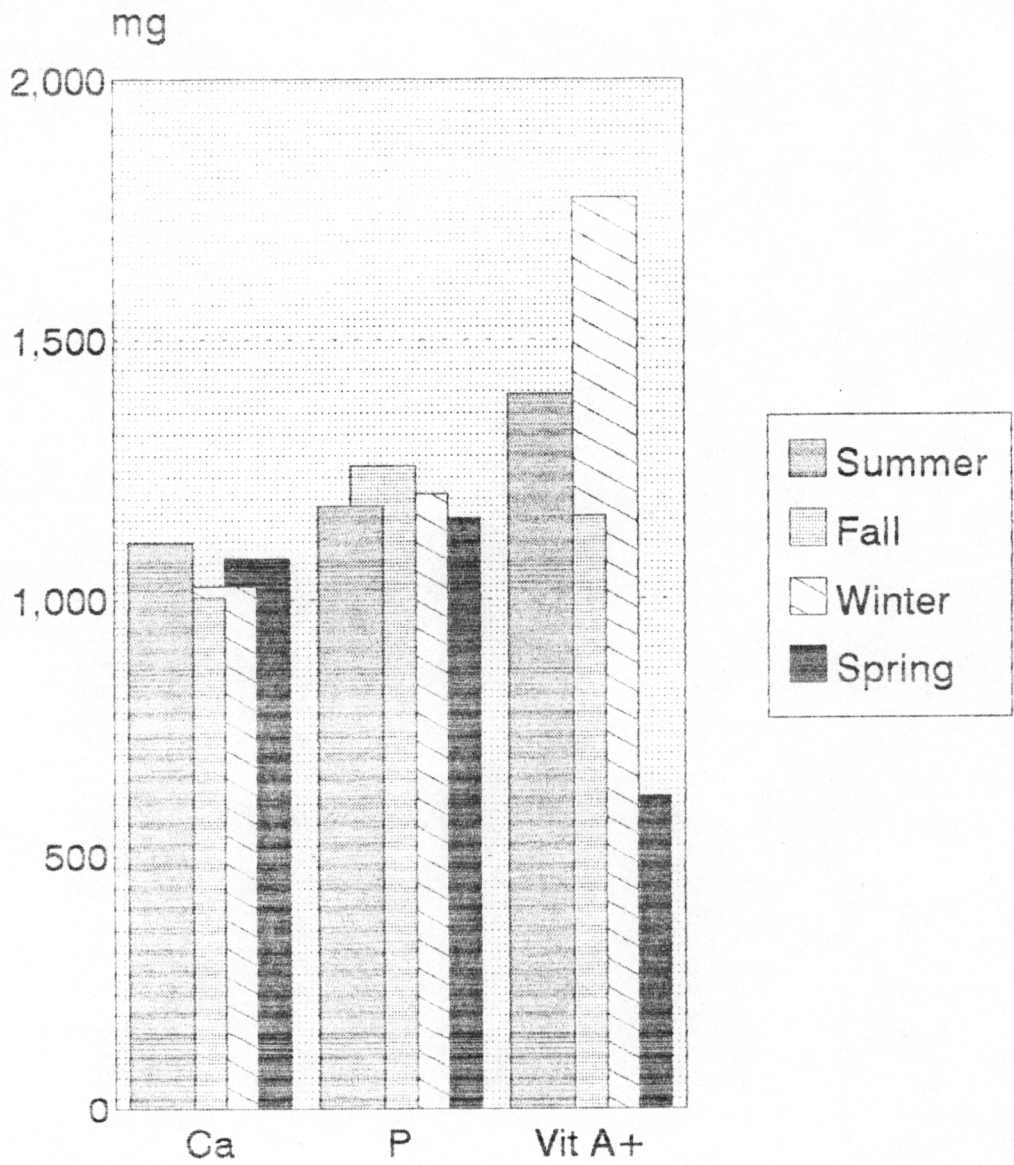


FIGURE 2F - The comparison of nutrients by season for 1775.  
 + units in re

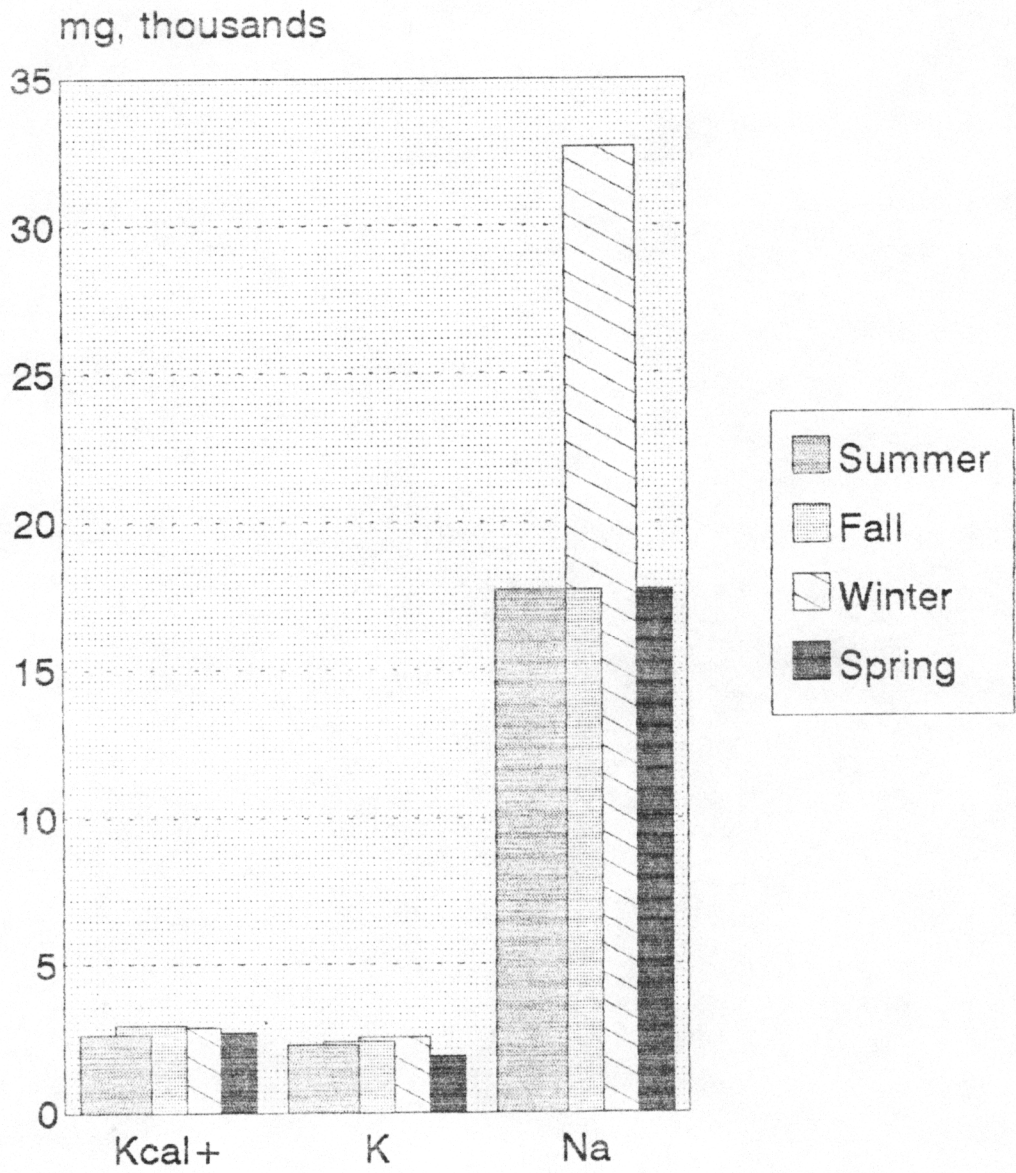


FIGURE 2G - The comparison of nutrients by season for 1775.  
 + units in kilocalories

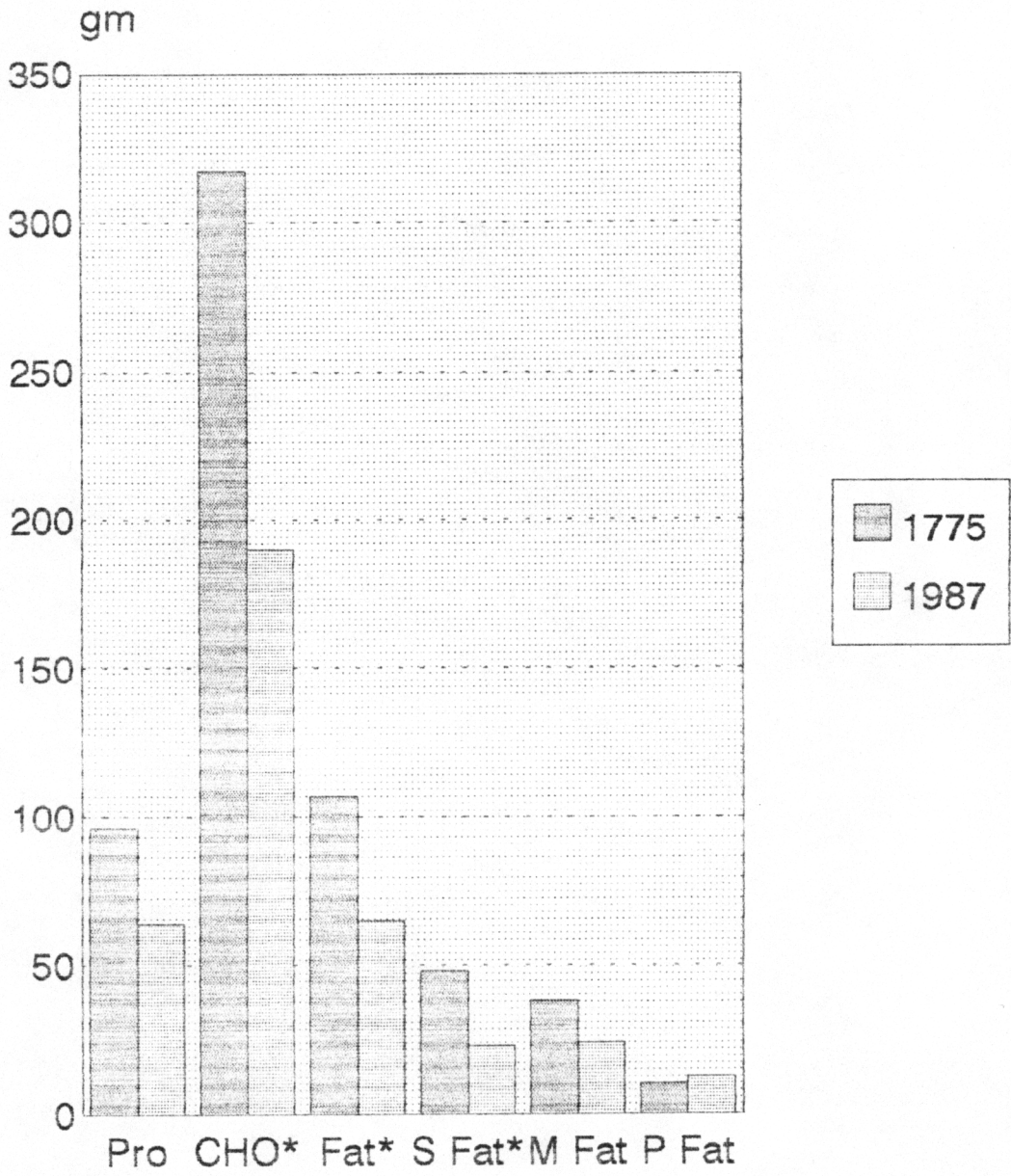


FIGURE 3A - The comparison of nutrients for 1775 and 1987 diets.  
 \* significant difference,  $p \leq 0.05$

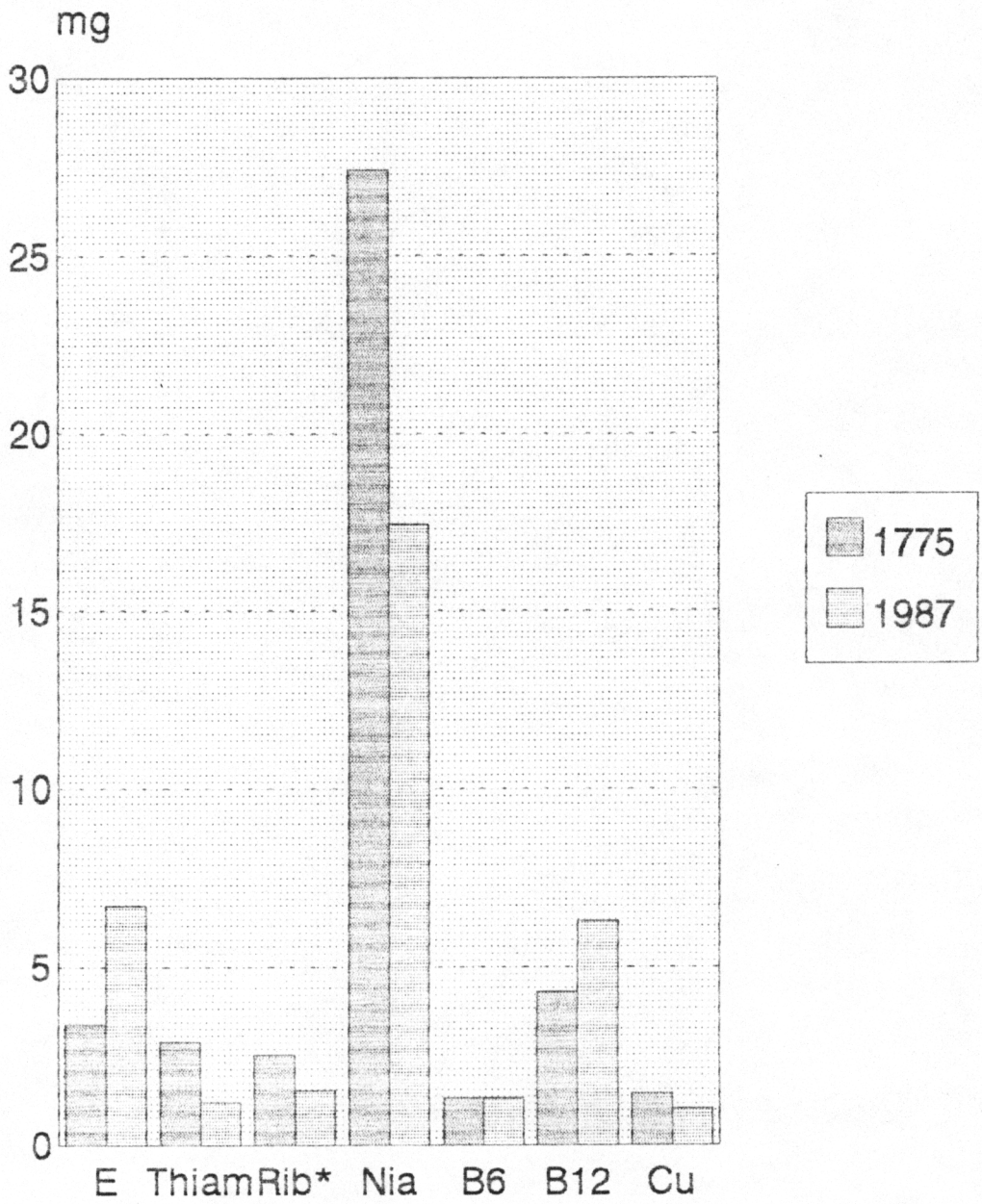


FIGURE 3B - The comparison of nutrients for 1775 and 1987 diets.  
 \* significant difference,  $p \leq 0.05$

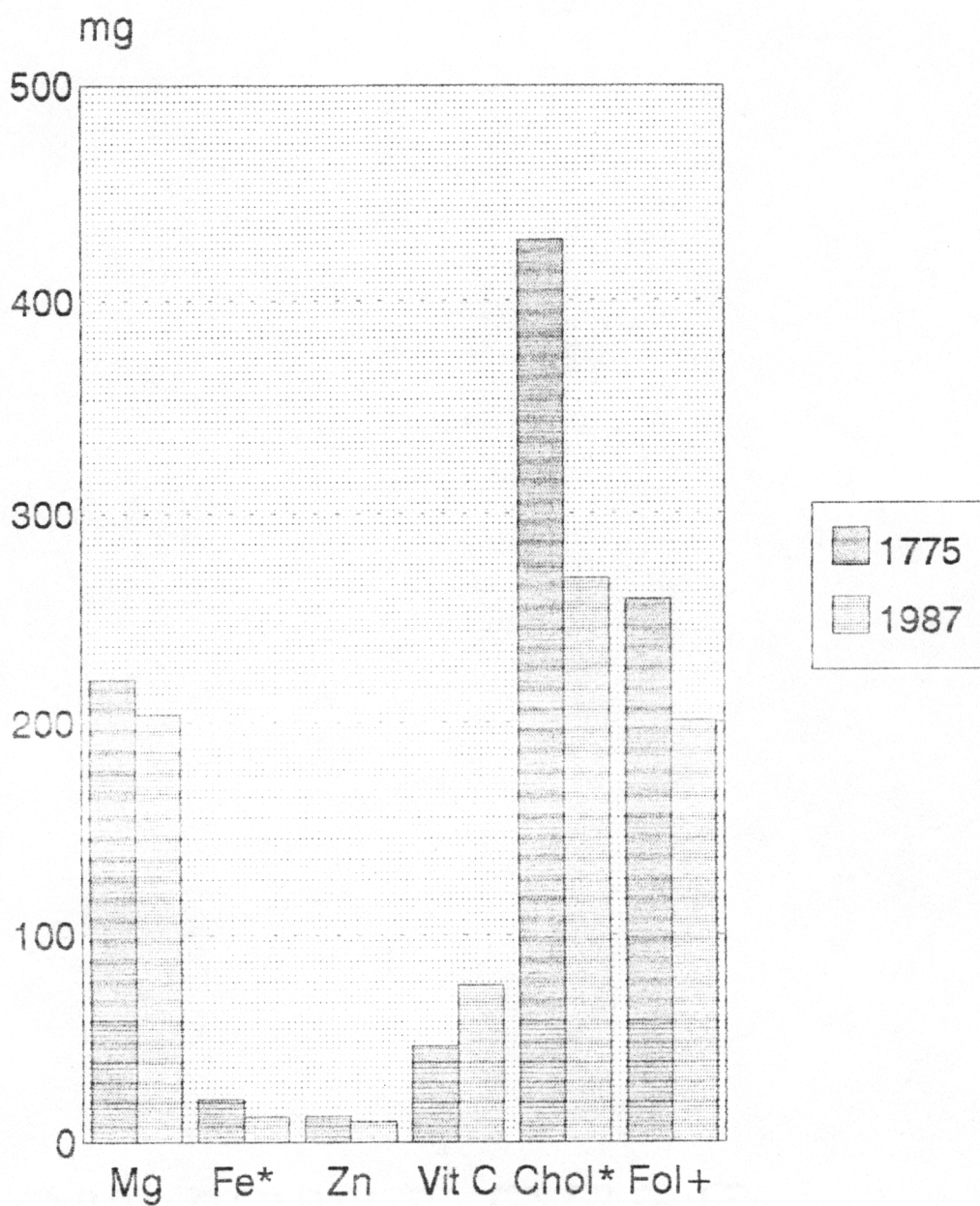


FIGURE 3C - The comparison of nutrients for 1775 and 1987 diets.

\* significant difference,  $p < 0.05$ , + units in ug



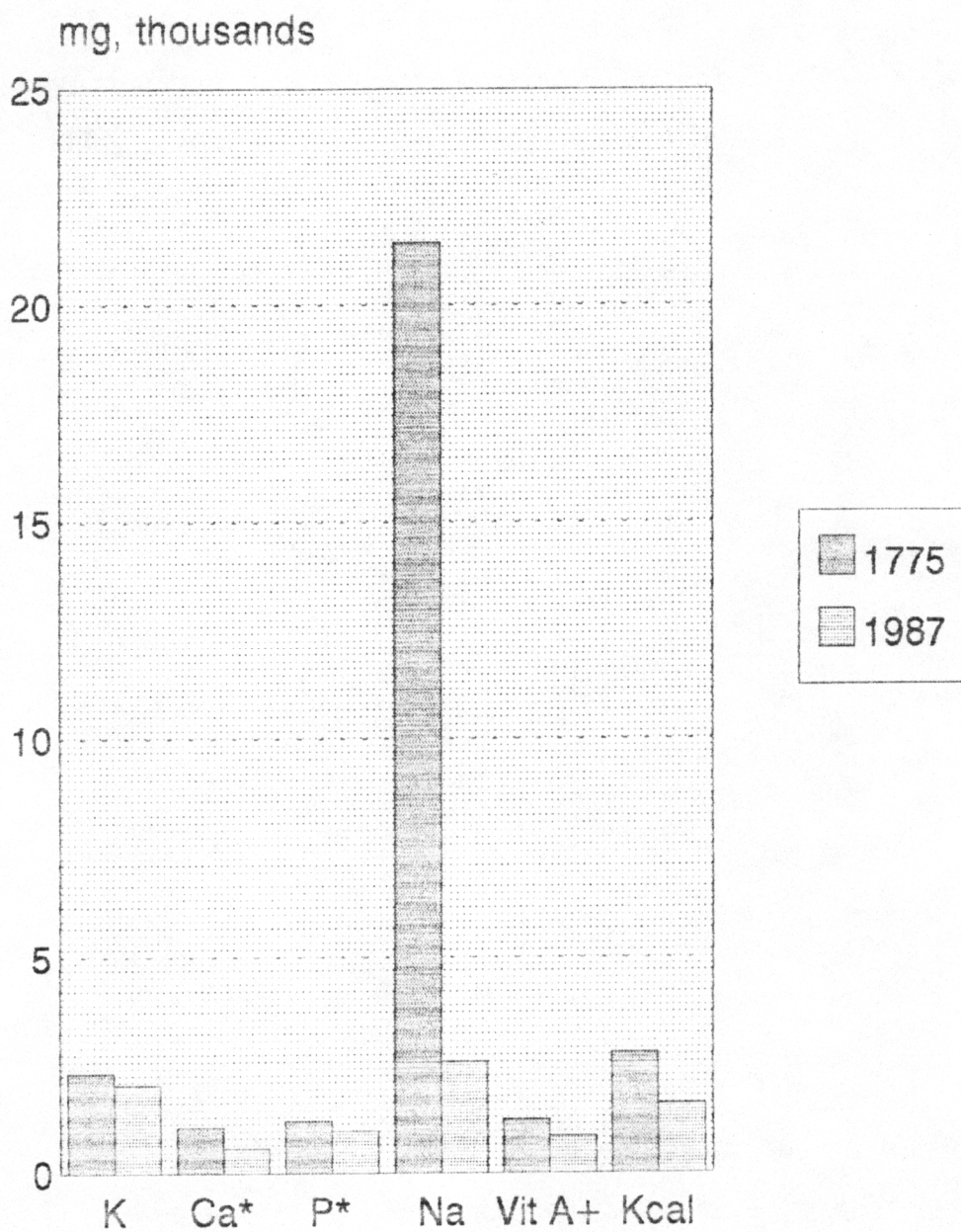


FIGURE 3D - The comparison of nutrients for 1775 and 1987 diets.  
 \* significant difference,  $p \leq 0.05$ , + units in re

## COMPARISON OF RDA

The desired goal is 100 percent of the RDA. The 1775 diet was below 100 percent for vitamin B6, vitamin C, vitamin E, calcium and magnesium (Figures 4A - 4C).

Vitamin B6 rich foods from the Moravian diet included fish, pork and eggs. Other sources such as chicken, kidney, liver, soy beans, oats and whole-wheat products were not as common in the diet. Perhaps a reason for the obtained percentage was that dairy products and red meats are not good sources of the vitamin. The same percentage for both diets could indicate that there were similar variations in the diet but this is difficult to determine since food sources are not known for 1987.

Vitamin C is found primarily in fruits and vegetables. Although the Moravians consumed a large portion of these foods, perhaps cooking, preserving and storage could have contributed to vitamin loss. The availability of citrus fruits and tomatoes may be a reason why the 1987 data has a higher value. In addition, ascorbic acid is added to processed foods frequently (National Research Council, 1989).

In the U.S., vitamin E is found in vegetable oils and products containing the oils. Examples include margarine and shortening. However, the Moravians consumed animal products, fruits and vegetables which are low in the vitamin (National Research Council, 1989).

Although the sources of calcium were few, the percent RDA consumed was higher for the 1775 diet than the 1987 diet. The opposite would be expected since the milk supply varied so much during the year for the Salem residents. Molasses could have been a contributor to the calcium levels and this sweetener was used extensively. Gingerbread and other sweets were popular and used this sweetener. The differences can be contributed to the computer analysis of the diets. The analysis used takes into account some of the modern day technological products that are used as preservatives and product enhancers. Bread and salt were found high in percentage of calcium and this could be contributed by calcium propionate (preservative) in bread and tricalcium phosphate (anti-caking agent) in salt. With the amounts of salt that the Moravians consumed, these additives contributed greatly to the calcium levels in the nutritional analysis. Therefore, the calcium intake of the Moravians was lower than indicated. In addition, an emphasis on increased calcium consumption has been directed toward women in recent years to prevent bone loss and the development of osteoporosis.

Magnesium is found in nuts, legumes and unmilled grains (National Research Council, 1989). These foods were not common to the Moravian diet. Perhaps the lower 1987 percentage can be attributed to the amount of processed foods eaten. For example, more than 80 percent of the mineral is lost when the

germ and the outer layers of cereal grains are removed (National Research Council, 1987).

There is no RDA established for fat, saturated fat, copper and kilocalories. The guidelines emphasized that fat should be less than 30 percent of total kilocalories and saturated fat less than 10 percent (National Research Council, 1989). Actual values for the 1775 diet were 34.4% total fat and 15.5% saturated fat. The animal products consumed by the Moravians were high in saturated fat and low in polyunsaturated fat. Sources such as vegetable oils and whole wheat products were not as common as in current diets. The Moravians did use sifted flour and not whole wheat. However, the flour was not as well sifted as that of today. An account stated that the flour ground at the Elrod mill was "much whiter than from our mill" (Salem Board Minutes, 1792, Fries (vol 5), 1968).

The estimated safe and adequate intake for copper is 1.5 - 3.0 mg/day (National Research Council, 1989). The amount in the 1775 diet was 1.4 mg/day (Appendix 1) which was just below the safe and adequate level. Organ meats, seafood, nuts and seeds are the sources of copper in the diet (National Research Council, 1989). The Moravian diet contained some sources of copper but not enough to meet 20th century standards. An explanation for the lower 1987 value could be that organ meats are not commonly consumed. Nutrition education has emphasized

the high cholesterol levels in the organ meats and encouraged moderate intake. Lower percentages for the 1987 diet in kilocalories, fat, saturated fat, polyunsaturated fat and cholesterol could possibly be related to the trend to reduce fat and cholesterol in the diet. Nutrition education is promoting proper nutrition as prevention of future health problems.

The guideline established for kilocalories for a female 19 - 24 years old with light to moderate activity level was 2,200 kilocalories per day (National Research Council, 1989). The Moravians consumed more kilocalories than the 1987 females.

Overall, the Moravians consumed a nutritionally adequate diet. This statement is based on the fact that the RDA for a nutrient is set at a higher level than required in order to cover all aspects of the population. Therefore, 70 percent of the RDA is considered adequate. For the 1775 diet, vitamin E was below this percentage (Figure 4B). Calcium and magnesium were 70 percent in the 1987 data (Figure 4C).

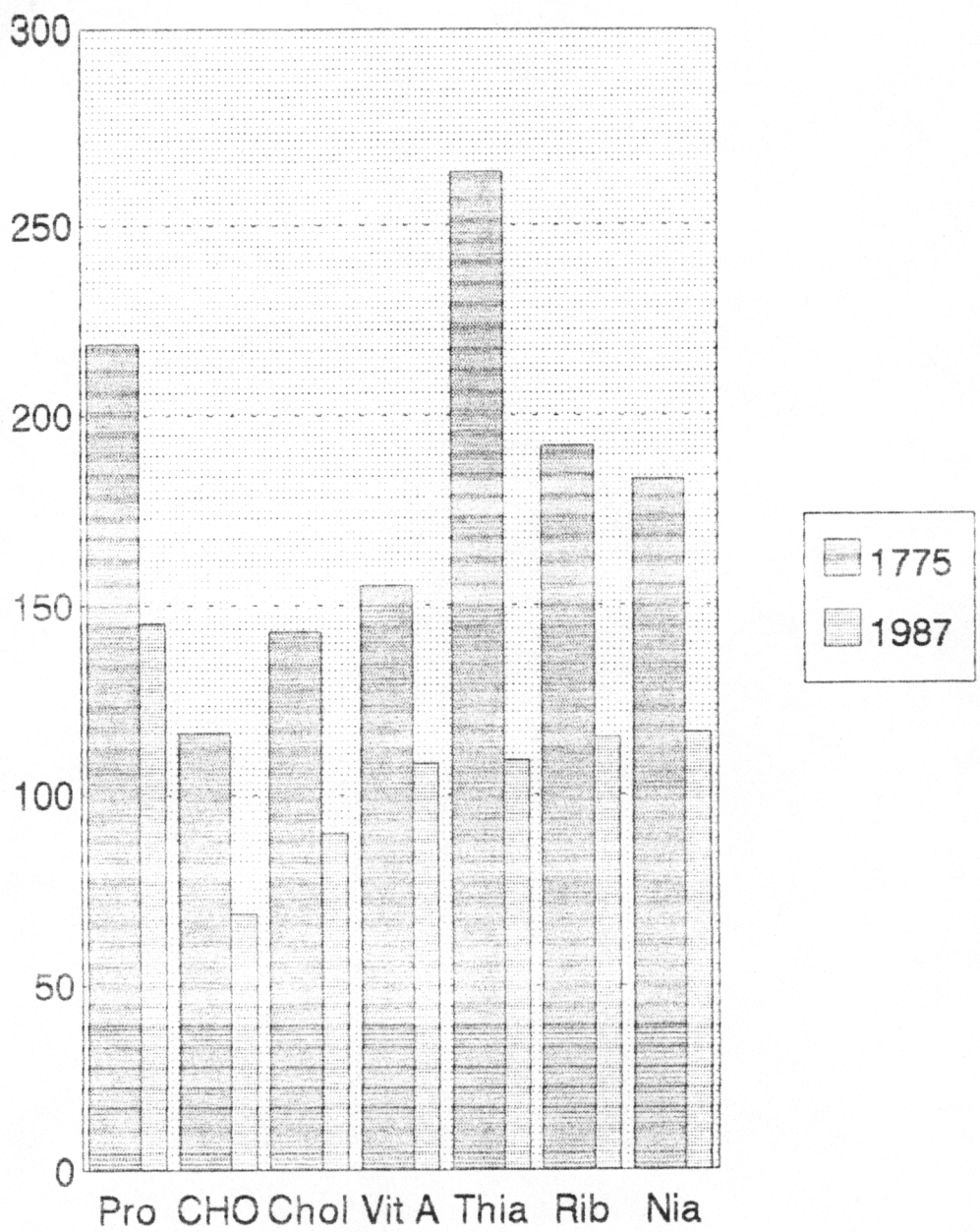


FIGURE 4A - The percentages of RDA for the 1775 and 1987 diets.

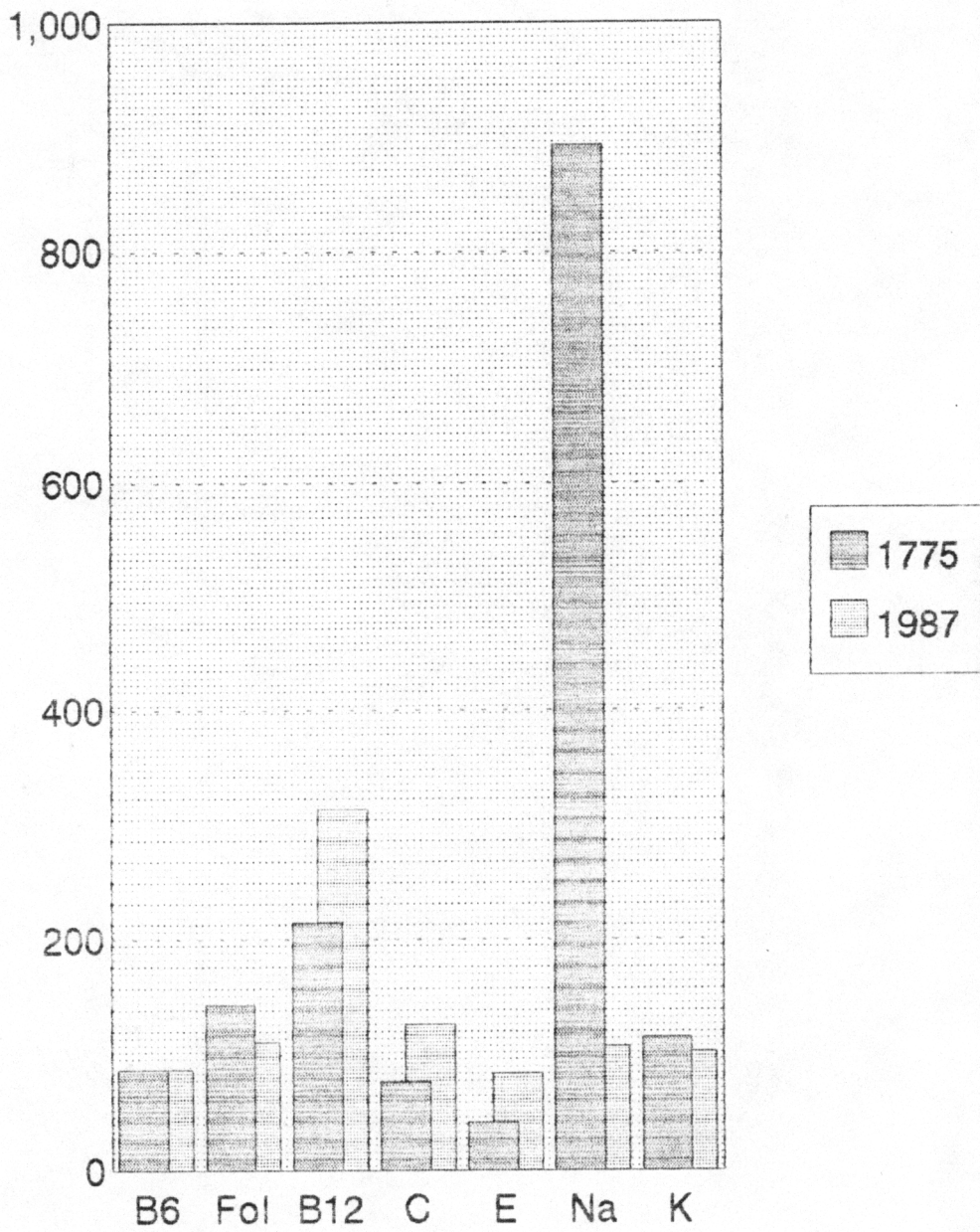


FIGURE 4B - The percentages of RDA for the 1775 and 1987 diets.

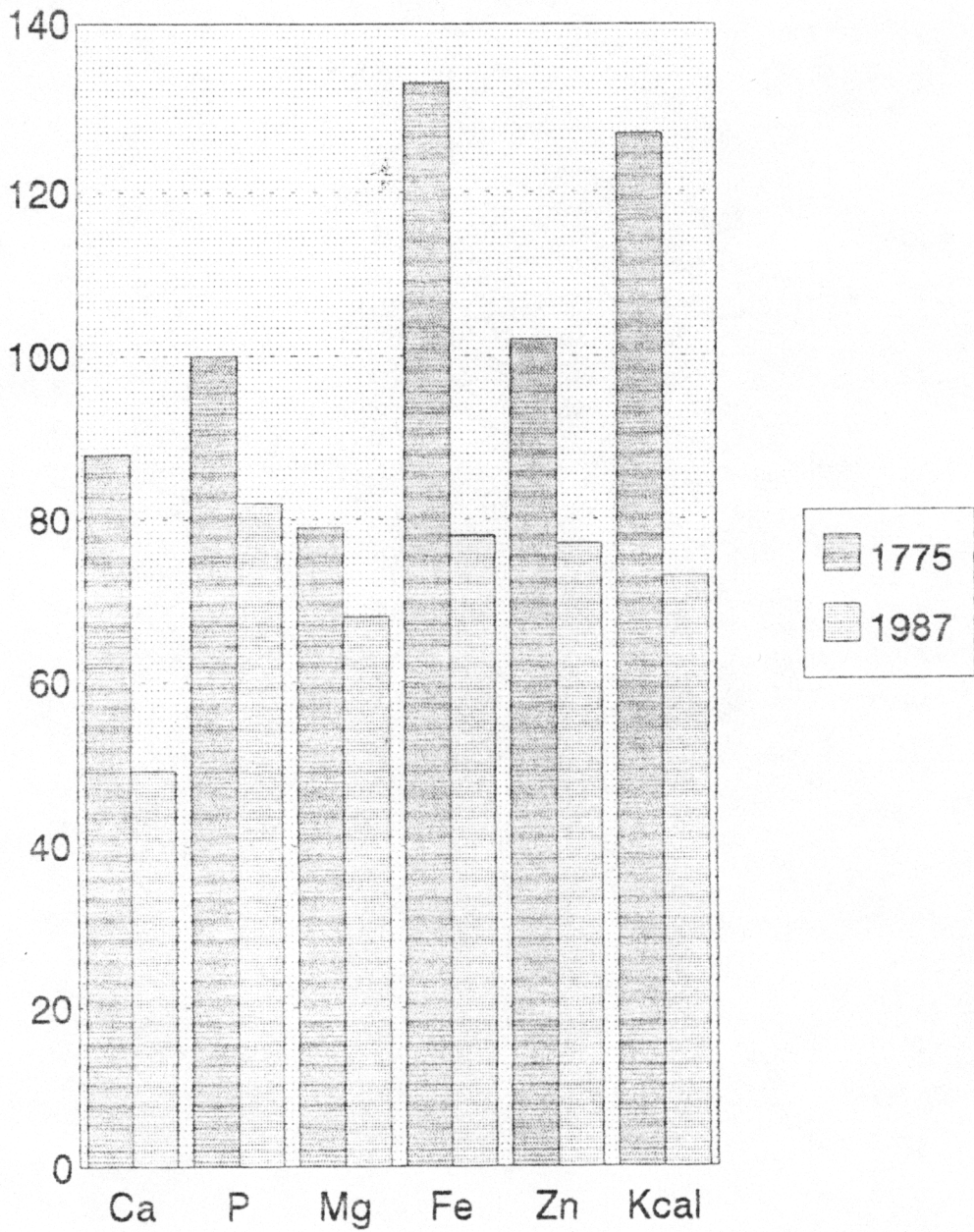


FIGURE 4C - The percentages of RDA for the 1775 and 1987 diets.



## CHAPTER 6 - CONCLUSIONS

The Moravians were a group of people with insight to the future. This was evident by their planning of the town, concern for good health and the foods grown and eaten. They consumed a variety of foods which resulted in a balanced diet. The 1775 diet appeared to be better balanced than the 1987 data. It appears that the Moravians were practicing good nutrition and perhaps were not aware of it.

There are some drawbacks with the Moravian diet that people today would consider "unhealthy." The amount of meat, butter and eggs eaten would be considered "hazardous" to those who are following current trends to reduce fat, saturated fat and cholesterol in the diet. However, the Moravians still lived to the fifties and beyond (Salem Diary, Fries, (vol. 5 - 6), 1968). This was unusual considering the time period. Perhaps it was their activity level that allowed them to eat high fat and cholesterol foods and still stay healthy. It should be noted that the cattle in the late 18th century were not like the cattle of today. Usually, the cattle roamed and ate grass and were fed little if any grain. This caused the meat to be leaner. Today, some cattle are grain fed and have a higher fat content than the cattle common to the Moravians. Therefore, the Moravians' diet may have not been as high in fat as was calculated.

The Moravians also consumed some form of alcohol daily. This practice was started at a young age as weak beer was brewed for the children. Research has shown that moderate consumption of alcohol can help increase HDL cholesterol levels. (Hulley and Gordon, 1981).

Bread was very important to the Moravian diet. There were numerous accounts mentioning bread. Wheat was the chief bread crop. Grains were harvested and stored for year round use. The ground flour was not as refined as today's flour. Therefore, some of the bran was probably left in the flour. This consumption of bread was similar to the Food Pyramid's (USDA, 1992) (Appendix 4) suggestion of consuming 6 to 11 servings of the bread, cereal, rice and pasta group. The Moravians ate so much bread because the grain was easily available, but today such foods are eaten for complex carbohydrates. The bread of the Moravians was very simple. Today, bread is made with enriched flour and preservatives. The values for iron, B6, riboflavin and niacin may have actually been lower for the 1775 diet than was calculated. The calcium propionate added to bread affected the calcium analysis of the study. With the amounts of bread eaten, the preservative may have contributed to the calcium intake. These were adaptations of using the Nutritionist III computer program.

Another possible reason for the quality of the Moravian diet was that foods were not processed as they are today. Foods were cooked and wheat ground but the Moravians did not have the technology that is available today which sometimes results in highly refined products. Perhaps more nutrients were retained than would have been expected or were added by the cooking process. For example, cooking in iron pots can add iron to the diet. Cooking times were not specific but Moss and Hoffman (1985) mention the directions for roasting a chicken was one half hour. Warning was given not to "spoil garden things by over boiling them. . ." (Hannah Glass, 1747). Fresh vegetables and fruits were more likely to have been gathered and consumed the same day during the spring, summer and fall months; therefore, resulting in less nutrient loss due to shipping and storage which can occur to produce in current grocery stores. Fresh fruits and vegetables were limited to the Moravians during the winter months.

Dairy products were limited to the Moravians. Possible reasons for this could have been the lack of refrigeration and that the calves required the milk as well. Milk and butter were the only dairy products mentioned. Milk was stored in springhouses. Boiling the milk before storing was found to extend its shelf-life (Old Salem Restoration Library).

Cheese did not seem to be part of the Moravian diet. Perhaps because the milk supply varied so much it was not

possible to have enough milk to make cheese. Today, there are many dairy products which are important to the diet. The Food Pyramid (Appendix 4) limits the consumption of dairy products to 2 to 3 servings per day. The Moravians also limited consumption during the fall and winter. With the increased consumption during the spring and summer, the Moravians probably consumed servings similar to the recommendation. For people today, the lesser amounts of dairy products are eaten by choice because of fat and cholesterol content, but the Moravians consumed lesser amounts by circumstance.

The Moravians could have followed the recommendation to reduce the amount of sodium in the diet. However, there was not any refrigeration available and salting and pickling were a major ways of preserving foods. A high sodium intake can be a risk factor in the development of hypertension. Today, there are numerous low sodium products and salt substitutes available to those lowering their sodium intake.

Recommendations for future nutrition education would be those similar to the guidelines that currently exist. Eating a variety of foods will provide the nutrients needed for a balanced diet. With the introduction of the Food Pyramid (USDA, 1992) (Appendix 4), hopefully this will become easier for people to learn and practice.

Further research could be conducted in the area of the Moravian diet. Examination of food preparation and its affect

on the nutritional quality of the diet is a suggested area. Information is needed about the changes in vitamin and mineral loss or addition due to cooking. How foods were preserved and their nutritional quality would be another study area.

Looking back to the past has indicated that food habits and practices were an important part of the survival of early settlers. The Moravians did not know anything about nutrition but they still ate foods that were healthy and that helped them sustain their lifestyle. The major difference between the 18th and 20th century is that foods were eaten mainly for substance and today they are often eaten for nutritional aspects as well.

## CHAPTER 7 -SUMMARY

Food is related to past history. By studying this history, a more complete understanding of food behaviors and food consumption can be formed. This link to the past may serve to benefit today's population. Examining the mistakes and misunderstandings of others in the past will assist current researchers in establishing a relationship between food behaviors and the nutritional status of certain populations or cultures. The close inspection of the Moravian diet provided the information needed to examine the food consumption patterns of the twentieth century.

Further research is needed in order to gain a better understanding of why settlers survived and how they did it. What contribution did food have in their survival rate? Was any of this information passed on so that it might be exhibited in the foods or food behaviors of the twentieth century? Using history as a learning tool, more information from the past can be used in predicting trends for the future.

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## APPENDICES

APPENDIX 1 - Comparison of Nutrients of Diets  
of 1775 and 1987

NUTRIENTS	MEAN FOR ACTUAL DIET		p
	1775	1987	
Kcal	2798.0	1605.0	0.04*
Protein (gm)	96.4	64.0	0.06
Carbohydrate (gm)	317.0	190.0	0.04*
Fat (gm)	107.0	65.0	0.05*
Sat Fat (gm)	48.2	23.1	0.055*
Mono Fat (gm)	38.3	24.3	0.06
Poly Fat (gm)	10.4	12.7	0.13
Cholesterol (mg)	428.5	269.0	0.05*
Vit A (re)	1236.5	861.0	0.50
Thiamin (mg)	2.9	1.2	0.08
Riboflavin (mg)	2.5	1.5	0.03*
Niacin (mg)	27.4	17.4	0.07
Vit B6 (mg)	1.3	1.3	0.95
Folate (ug)	259.8	201.0	0.12
Vit B12 (mg)	4.3	6.3	0.13
Vit C (mg)	46.0	76.0	0.09
Vit E (mg)	3.4	6.7	0.10
Sodium (mg)	21441.0	2587.0	0.12
Potassium (mg)	2323.5	2052.0	0.48
Calcium (mg)	1055.5	584.0	0.04*
Phosphorus (mg)	1199.5	978.0	0.05*
Magnesium (mg)	220.8	204.0	0.30
Iron (mg)	20.0	11.7	0.03*
Zinc (mg)	12.2	9.2	0.13
Copper (mg)	1.4	1.0	0.17

p ≤ 0.05

\* indicates significant difference

APPENDIX 2 - Comparison of Nutrients by Season  
of 1775 and 1987

<u>NUTRIENTS</u>	<u>SUMMER</u>	<u>FALL</u>	<u>WINTER</u>	<u>SPRING</u>
Kcal	2648.0	2948.0	2890.0	2704.0
Protein (gm)	90.0	105.0	101.0	89.5
Carbohydrate (gm)	300.0	310.0	344.0	317.0
Fat (gm)	107.0	118.0	98.2	105.0
Sat Fat (gm)	50.0	53.0	40.8	50.0
Mono Fat (gm)	36.8	42.7	36.7	36.8
Poly Fat (gm)	9.6	11.0	11.5	9.6
Cholesterol (mg)	422.0	467.0	410.0	415.0
Vit A (re)	1395.0	1161.0	1775.0	615.0
Thiamin (mg)	2.5	3.1	3.6	2.5
Riboflavin (mg)	2.5	2.5	2.5	2.5
Niacin (mg)	25.2	29.1	30.3	25.9
Vit B6 (mg)	1.0	1.5	1.7	0.9
Folate (ug)	295.0	246.0	246.0	249.0
Vit B12 (mg)	4.7	4.7	3.0	4.7
Vit C (mg)	55.1	44.1	53.1	31.1
Vit E (mg)	3.2	3.4	4.9	2.1
Sodium (mg)	17694.0	17678.0	32677.0	17715.0
Potassium (mg)	2309.0	2419.0	2572.0	1894.0
Calcium (mg)	1111.0	1005.0	1025.0	1079.0
Phosphorus (mg)	1181.0	1258.0	1203.0	1156.0
Magnesium (mg)	233.0	225.0	223.0	202.0
Iron (mg)	19.8	19.9	20.5	19.6
Zinc (mg)	12.2	13.9	10.8	12.0
Copper (mg)	1.3	1.5	1.7	1.2

APPENDIX 3 - Percentage of RDA of  
Diets for 1775 and 1987

NUTRIENT	1775 DIET	1987 DIET
Kcal	127	73
Protein	219	145
Carbohydrate	116	69
Cholesterol	143	90
Vit A	155	108
Thiamin	264	109
Riboflavin	192	115
Niacin	183	116
Vit B6	87	87
Folate	144	112
Vit B12	215	315
Vit C	77	127
Vit E	43	84
Sodium	893	108
Potassium	116	103
Calcium	88	49
Phosphorus	100	82
Magnesium	79	68
Iron	133	78
Zinc	102	77

APPENDIX 4 - The Food Guide Pyramid

1 2 3

4 5 6

## VITA

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