EVALUATION OF SELECTED CONVENTIONAL AND FROZEN CONVENIENCE ENTREES FOR USE IN A SCHOOL LUNCH PROGRAM

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CHAPTER I

INTRODUCTION

The importance of school lunch and its contribution to the well-being of the nation's children has been well established. There is wide recognition of the fact that to properly educate children, attention must be given to their nutritional needs as well as their intellects. Proper nutrition is one of the factors affecting a child's ability to learn, and nutrition education encourages habits which can promote a student's nutritional status throughout his lifetime. The school is in a position to contribute to both the practical and the educational aspects of nutrition through the school lunch. For this reason, a great deal of support has been given to the concept of school lunch by educators, parents and by means of legislation.

However, there are millions of children who are not yet benefiting from a school lunch program. Thousands of schools have no school lunch at all. Rising food costs, labor problems, lack of facilities, and inadequate finances make it difficult for many school districts which do have school lunch to sustain their programs. Strengthening and expanding school lunch has become an accepted goal.

In searching for a solution to problems faced by school lunch, several concepts have been introduced which are variations from the traditionally run operation. Caterers have been employed by some school districts to manage their lunch programs. Vending machines have been

used to dispense lunches, and systems have been established for production of the meals for several schools in central kitchens.

The use of frozen prepared foods is another concept which has seemed to offer some solution to the problems faced by school lunch. In recent years, there has been a great deal of publicity concerning the use of frozen "convenience" foods for all types of food service institutions. However, there has been very little actual research evaluating their use for school lunch programs. With the exception of an extensive study done in the New York City public schools, under the auspices of the Educational Facilities Laboratories, Inc., documented research involving the use of convenience foods for school feeding is almost non-existent. To properly evaluate the concept of using frozen convenience foods for school lunch, more research is needed.

In this research, an attempt will be made to develop methods for determining actual food cost, labor requirements, and student acceptance of frozen convenience entrees used in a school lunch program, as compared with similar products conventionally prepared. An exploratory study will be conducted in a school lunch facility which will compare selected frozen convenience entrees with similar entrees conventionally prepared in terms of food costs, labor requirements and acceptability.

CHAPTER II

REVIEW OF LITERATURE

School Lunch

School lunch originated in Europe as an outgrowth of the Industrial Revolution. Reforms in child labor practices brought about an increase in the number of unemployed school-age children and aroused public concern for their welfare. The feeding of children is said to have begun in Munich, Germany, when in 1790, soup kitchens for the unemployed were established by Count Rumford.(1) Subsequently, the kitchens began serving meals to hungry school children. In France, in 1849, a contribution made by the National Guard was used to provide a noon meal for children of the poor. Victor Hugo fed school students in his home in England in 1865. The following year an organization was established in London for feeding needy school children; and in 1906, legislation was passed which provided for the preparation of food for children attending elementary schools. The concept of school feeding spread to most European countries, and many of them passed national acts providing for school meals.

In the United States, the development of school lunch began in 1853 when the Children's Aid Society of New York City organized a school to educate and feed vagrant children. Ellen H. Richards was credited with instigating the first real school lunch program 40 years later. As the result of her efforts, an order was passed in 1894 for the feeding of

school children in Boston.[2] Between 1905 and 1910, school boards in other cities followed this lead. In 1905 there were three cities with school lunches. This number had grown to sixteen by 1916.[2] The growth of the science of nutrition during the early 1900's, and the revelation that many of the men who volunteered for military service during World War I were malnourished, gave an impetus to the development of school feeding programs. By 1931, 64,500 schools in the United States had cafeterias.[2]

Growing concern about faulty nutrition in this country prompted the passage of federal legislation in 1933 to provide loans to communities for the labor costs of lunches served in schools. In 1935 the federal government also began to donate surplus foods to the program.[3] However, the surplus donations were stopped during World War II because of food commitments to the armed services. Again during World War II, it was discovered through military recruitment procedures that many of the young men in the United States were malnourished.

In 1946, Public Law 396 was passed establishing the National School Lunch Program.[2] This legislation provided for aid to schools which meet federal requirements. The aid is in the form of 1) a small cash reimbursement for each "Type A" lunch served to children, and 2) food purchased by the U.S. Department of Agriculture solely for use by schools in the federal lunch program. The federal government also distributes some surplus food to other school food centers which apply for it. The Special Milk Program provides a small cash reimbursement on half-pints of milk served to children by school food centers.

To participate in the National School Lunch Program, a school food service must adhere to the requirements of Type A lunch, which is

designed to provide one-third of the recommended daily dietary allowance for children 9-12. Minimum requirements for Type A lunch are:[4]

½ pint of fluid whole milk as a beverage.

2 oz (edible portion as served) of lean meat, poultry, or fish, or two oz of cheese, or 1 egg, or ½ cup of cooked dry beans or dry peas, or 4 tablespoons of peanut butter or an equivalent combination.

3/4 cup serving consisting of two or more vegetables or fruits or both.

One slice of whole grain or enriched bread.

Two teaspoons of butter or fortified margarine.

In addition, the school must serve meals without cost, or at reduced cost, to children unable to pay the full price of the meal--without discrimination or segregation of children unable to pay. The program must operate on a non-profit basis.

The National School Lunch Program has spurred the growth of the school food service industry into a billion-dollar-a-year business, according to Cutlar.[4] She reports that in 1967, more than 73,000 schools served Type A lunches to about 20,000,000 children. Of the three and three-tenths billion lunches served during the 1967-1968 school year, twelve and one-half per cent of the lunches were provided free. The National School Lunch Program alone consumes 350,000,000 pounds of surplus commodities annually, and a like amount in local purchases.

Presently, the school lunch program is facing several problems. As is true of all food service institutions, school lunch operators must cope with labor problems, a shortage of space and facilities, and rising

food costs. The labor problem is two-fold: cost and availability. In addition to a general rise in wages, the Fair Labor Standards Amendment of 1966 extended minimum wages to all employees of public and non-profit private elementary and secondary schools.(5) Coverage began in February 1967, so the full impact was first felt during the school year of 1967-1968.

Labor supply varies in different sections of the United States. The University of Missouri conducted a survey of school lunch operations in five Midwestern states in the summer of 1967.(6) Eighty-nine per cent of the directors reported that there was little difficulty in locating new employees. However, current literature indicates that in industrial areas, there is a shortage of labor available to the food service industry. Kotschevar(7) estimates that in 1967, the food service industry employed four to five million persons, and thereby was the largest single industrial employer in the United States. In projecting future needs, Kotschevar states that by 1980 the food service industry will need an additional 4,000,000 workers. This would seem to indicate that there will be an upward pressure on wages, and an increasing shortage of skilled labor.

A greater problem than labor is the lack of facilities. Cutlar(4) writes that millions of children attend schools where there is no school lunch program, and in many cases it is the children who need it most to whom school lunch is not available. The areas most often lacking in school lunch facilities are rural poverty pockets and the lower income neighborhoods of our cities. In those schools which do have facilities, steadily increasing school enrollments, and failure of voters to approve new facilities are resulting in reduced time for children to eat, and

overcrowding in the dining room, as well as shortage of space and equipment in the kitchen. In addition, new government programs, such as the Headstart Program, the feeding of breakfast to underprivileged children, and free lunches to the poverty-stricken, are putting even greater demands on school lunch facilities.(8)

School lunch also is caught in a cost-price squeeze. In research reported in 1967 by the Department of Agriculture, a Type A school lunch cost approximately fifty cents.(4) Federal cash and commodity donations amounted to about 11 cents per meal. The rest of the meal cost came from local support. The Federal cash subsidy dropped from 9 cents in 1946, to about 5 cents in 1967. Inflation, of course, has further reduced the importance of this cash donation. The value of commodities given to the National School Lunch Program in 1967 was 6.5 cents per meal as compared with 2 cents in 1946. However, the future outlook is for a reduction in commodity donations. Farm surpluses are being siphoned off by world food demands and the results are higher food costs and an eventual cutback in government commodities for the National School Lunch Program. Hegner(8) quotes Dr. John Perryman, executive director of the American School Food Service Association as saying, "We have to wake up to the fact that there are no more food surpluses. After twenty years, we must now come to grips with the question of whether our school lunch program is for the benefit of the children or merely a means of dumping our surpluses." Herbert Rorex, director of the National School Lunch Program, is hopeful. He states, "It is the national policy to sponsor a school lunch program--with or without surpluses....I think Congress feels the same about school lunch legislation today as it did twenty years ago."(8)

Meanwhile, as Hegner[8] points out, school lunch cannot cope with rising costs and increased demand by reducing quality or quantity. Nor can it easily raise prices. New concepts are being tested in the search for solutions: the utilization of food service contractors, vending of foods, new experiments in management and operations, such as the central kitchen, and use of convenience or ready-prepared foods.

Catered school lunch became a subject of controversy in the mid 1930's when contracts were awarded by some of the New York City schools to outside concessionaires.[9] School patrons objected to the fact that the concessionaires used school facilities and kept all profits. Since that time, a number of schools have converted to catered cafeterias, with varying degrees of success. School lunch systems in Scarsdale, New York, and Hillsdale, New Jersey, resorted to the concessionaire system when unable to operate successfully by other means. Both of these upper middle class communities have been satisfied with results. However, schools in Newark, New Jersey, and in Brooklyn, New York, tried catered service and found it unsatisfactory. Prices were high and in some cases the food was of poor quality. A big objection to catered school lunch is that with its use, a school is not eligible for federal aid. Bard[9] suggests that catered cafeterias are probably best suited to more well-to-do districts.

Some schools are using vending machines to dispense lunch. For example, students who attend high school in Glendura, California, are able to obtain lunch either from vending machines or from a cafeteria[9]. Lunches from the cafeteria are eaten by the students in their classrooms, while vended foods are eaten on benches outdoors. According to Hegner[8], a few years ago, most school lunch vending was centered in California,

where the growth of schools was fantastic and the climate conducive to "patio dining". Today, there are about 1500 schools vending foods to students all over the United States. This is in spite of the fact that even vending manufacturers admit that you cannot vend a Type A lunch and do it well. Hegner[8] cites the use of vending machines in Barrington, Illinois, and in Schaumberg, Illinois. Vending machines are also being used for the school lunch program in Holland, Michigan.[9] According to the financial secretary of the Holland Board of Education, the Holland School District wanted to "stay out of the lunch business". Therefore, the district built a new high school in 1962 without a kitchen or cafeteria. Instead of investing in conventional facilities, two "eat or study" areas were provided, connected by a corridor containing fourteen vending machines. Quality of the food has been considered satisfactory, but prices are high.

When vending machines were used to supplement the high school cafeteria operation in Redondo, California, results were disappointing, according to Mrs. Margaret Brown, school lunch supervisor.[9] There were technical problems, as well as complaints about quality and prices. Bard[9] reports that Oakland, California, abandoned the idea of using vending machines for school lunch after a three-month experiment. The machines were too difficult for younger children to operate, and were mechanically unreliable.

Many who are involved in school lunch programs object to the use of vending machines because a profit is being made by a commercial enterprise operating on school property. Mary de Garmo Bryan[1] writes that a school cafeteria which is built and equipped by public funds should not be run by any individual for his own profit.

The central kitchen is another answer to the problem of providing meals for children in large cities and rural areas where schools are without lunch facilities. The central kitchen concept involves bulk preparation of food in a central facility and its distribution each day to satellite schools. Central kitchens are being used to prepare four types of lunches:[9] regular plate lunches, modified tray pack plate lunches with hot and cold foods, soup and sandwich lunches, and cold packaged lunches.

In Norman, Oklahoma, a central kitchen was opened in 1966 to prepare regular plate lunches for more than 3700 public school students.[10] Bard[9] cites the following examples of central kitchen systems. In Kansas City, Missouri, the central kitchen concept is being used as an alternative to large scale replacement of old equipment. According to Mrs. Ruth Hose, Kansas City School Cafeteria Director, an even larger economy is labor. In Kirksville, Missouri, the school system was in danger of losing its Triple A rating because it had no school lunch program. Rather than spend a quarter of a million dollars putting kitchens into every school, a central kitchen was included in a new high school built in 1959. In Detroit, School Lunch Director, John Carter, states that high labor costs have made it necessary to reduce staff by preparing meals in central kitchens, using a minimum number of employees.

A study conducted by the United States Department of Agriculture in 1965 describes a central kitchen system in Bremerton, Washington, which prepares a modified tray pack lunch.[11] There, the central kitchens prepare packaged Type A lunches which include an aluminum tray of hot food items and a cellophane packet holding cold items. The aluminum trays are heated at the receiving schools, and the trays and cold

packets are served to the children in their classrooms.

The New York City School Lunch Program is described in the same study. In 1962, New York City was using a central kitchen to prepare 144,000 soup and sandwich lunches per day. Six hundred-fifty of New York's 1000 public and private elementary schools were the recipients of these lunches. Almost none of these schools had a lunch program before the central kitchen was put into operation.

St. Louis, Missouri, first put a centralized school lunch system into operation in 1959[9]. In 1962, twenty-eight of 125 public elementary schools were served regular plate lunches prepared in five central kitchens, while twenty-two schools had their own facilities. By 1967, however, there were 150 elementary schools in the school system, and still, only fifty of the schools were getting school lunch[12]. In order to expand the lunch program to all 150 schools by 1969, the Director of Food Service, David R. Page, developed a packaged cold lunch which meets Type A requirements. It consists of a sandwich with two ounces of protein, or a menu item like fried chicken, a quarter cup of raw vegetables or salad, a piece of fresh fruit, cookies, and a half-pint of milk. The lunches are prepared in eight central kitchens and distributed in refrigerated trucks.

The District of Columbia also began to use a centralized bag lunch system after several school children were photographed foraging in a garbage can during the noon hour for scraps of food[9]. By 1962-1963, 7000 cold, packaged Type A lunches per day were provided in 82 elementary schools.

The 1965 study by the Department of Agriculture reports that the central kitchen concept is used to prepare cold, packaged Type A lunches

for rural schools in West Virginia[11]. Eleven central kitchens service 48 schools, some of which have no running water. A concurrent health survey of participating students in Fayette County shows significant health benefits resulting from providing lunch service to these students[9].

In Indianapolis, only 50% of the 120 elementary schools have lunch rooms, so box lunches are centrally prepared and distributed to the remaining schools for all children who live more than seven-tenths mile from school[13]. Pre-schoolers in the Head Start Program are fed also. Indianapolis does not participate in the National School Lunch Program.

According to Bard,[9] several hundred school systems are using central food preparation systems for their school lunch programs. However, there is disagreement regarding the merits of a centralized system. Reasons cited for using central kitchens are the savings in labor, substantial savings in capital outlay, the enabling of centralized purchasing and accounting, and uniformity in portion and quality of food served. On the other hand, critics of centralized systems claim that transportation costs, the expense of equipment for the central kitchens, delivery costs, warehousing costs, waste food, and the necessity for hiring personnel to distribute the food at receiving schools make the system uneconomical. Chicago's experience with a central kitchen system would seem to bear this out. The Chicago School Lunch Program recorded a loss of $7,000 per month while using a centralized system to provide hot meals for thirty schools[9]. Other objections to the central kitchen system are that the food loses nutritive value and appeal by the time it has been held long enough for transportation to schools, that there is a loss of personal attention to the children, and that menus must be

limited to those items which can be transported. A case in point is the School Lunch Program in Boston. Centralized kitchens were tried in Boston in 1940, but it was decided that trucking costs and the difficulty of timing the arrival of meals, as well as menu restrictions imposed by the central system made central kitchens impractical[9].

New York City is currently phasing out its central kitchen system and is experimenting with precooked frozen foods[11]. Under the central kitchen system, the city schools are unable to make full use of commodities, menus cannot be varied for ethnic and religious groups in the city, and weather and traffic problems make delivery times unpredictable.

In developing a frozen food system, New York City conducted an extensive testing program under a $75,000 grant from Education Facilities Laboratories, Inc.. Bard[9] discusses the study in detail in his book, "The School Lunchroom. Time of Trial". Several schools in downtown Manhattan were selected for conversion to frozen food service. Some had conventionally equipped kitchens, while others were satellite "soup and sandwich schools" especially equipped for the frozen food project with convection ovens. Outside processors were found to produce frozen prepared menu items suited to the schools' needs. Control schools prepared the same daily menu using conventional method of preparation. Two types of product were tested: bulk precooked frozen foods, which were heated and then portioned onto plates, and individually portioned precooked frozen lunches, similar to the TV dinner.

The individually portioned lunches were less satisfactory than the bulk products, as not all the foods on the tray reached optimum serving temperatures at the same time. According to Willett[14], there also were problems with the bulk products involving storage, weight losses

when the product was reheated, a lack of uniformity, and a high bacteria count in some processed food. In spite of these problems, the use of bulk frozen foods was considered successful.[9] It was estimated by Kevin Howard, Director of School Lunch for New York City, that labor savings resulting from the use of frozen prepared foods would amount to 40% or higher, as compared with the cost of labor for conventional methods of preparation. School lunch officials observed that there was an apparent reduction in the amount of plate waste from that which was normal from the soup and sandwich lunches prepared under the central kitchen system. Sidney Aptekar, coordinator of the New York Study, states that food costs for the convenience meals were nearly the same as that for the meals prepared conventionally. This was attributed to the know-how of processors who provided the convenience products. Both conventional and convection ovens were found to be satisfactory for reconstituting the frozen products.

In a discussion of the New York City study, the following statements were made in "20 Million For Lunch", published by Educational Facilities Laboratories.[15]

> In the experimental program, New York has developed an efficiency foods system with major emphasis on frozen foods. The use of frozen foods without the system would be neither dramatically new nor financially sound. Efficiency foods must be used within the framework of an efficiency foods system if potential savings are to be made. The "system" sold by efficiency food processors is an operating plan tailored to each customer which suggests the management concepts needed for maximum utilization of existing facilities and the current labor force. Marketing philosophy is based on the fact that if the food service operator can reduce his costs and offer his customers a wide variety of attractive meals both the food service operator and the processor will benefit from savings achieved. A dramatic example of the potential for an efficiency foods system is the experiment conducted in the New York City school system. Starting with two schools in

the 1965-66 school year, it was expanded to sixty schools for the 1967-68 school year.

Based on results of the study, New York City Schools are now planning to build all its new schools with kitchens designed for using a frozen convenience food system. The first school to be built with such a kitchen was P.S. 45, described in the January 1968 issue of School Lunch Journal[16]. Also, as a result of the New York study, officials of the Department of Agriculture have become interested in frozen prepared foods as a possible answer for the 45,000 public schools throughout the United States which are currently without lunch service[9].

Frozen foods also were tested in an experiment involving two schools in a more typical school lunch system in Rochester, New York[17]. A comparative study of a school using convenience foods and one using conventional foods was made by Miss Betty Montanarella, School Lunch Director. Miss Montanarella stated that results after three months showed a saving in labor costs, which more than offset the higher food cost of the frozen foods. Participation increased in the school where frozen foods were used over that of the control school.

Bard[9] reported that the schools in Commack, Long Island, New York, and in Larkspur, California, tried using frozen foods and found the "convenience method" to be unsatisfactory. These school districts attempted to prepare, cook and freeze the menu items in their own facilities, rather than buying the products from an outside processor. The project was unsuccessful due to menu troubles, mechanical breakdowns and other problems.

As is true with other innovations in school lunch service, the use of frozen prepared foods is a continuing subject for controversy. The editors of School Lunch Journal devoted the March 1968 issue to the

subject of using these so-called "convenience foods". Advantages to be expected if using frozen prepared products were listed by the editors as:[18]

> saving labor costs at the most expensive levels; cooks and bakers,
> allowing better and more consistent quality control,
> allowing more children to be served in a shorter time,
> reducing the space needed for kitchen and storage,
> reducing the chance of spoilage,
> allowing more variety on the menu.

Objections to the use of frozen prepared products were:

> quality inferior to conventionally prepared foods,
> prohibitive costs,
> reduced opportunity for using government commodities,
> loss of pride in preparation of menu items.

The School Lunch Journal editors suggested that while use of frozen prepared foods may be justified in a large metropolitan area, the use of these convenience products in schools of a smaller district could prove to be a financial disaster.

Convenience Foods

The use of frozen prepared foods has been a rather recent development in the food service industry[19]. Precooked frozen foods were first important in the 1940's, but lack of quality standards diminished their appeal. In the late 1950's home freezers became popular and quality frozen food products began to appear at the retail level. The use of fully prepared precooked frozen foods by the consumer was not paralleled, however, by their use in the food service industry. Recently, attention has been focused on these products as a possible solution to the problems of increased labor costs and shortage of skilled labor, declining productivity of food service workers, rising food costs, increasing capital investment in space and equipment, and growing demands on food service institutions.

Current literature cites a number of case studies where frozen prepared products have been used for institutional food service. Myers[20] reports that after a pilot study was completed in February, 1968, the State of Massachusetts converted the food service of all state institutions to the use of frozen products in order to relieve a critical shortage of labor.

A number of hospitals are using frozen prepared products successfully. In 1966 when expansion became necessary, St. Mary's Hospital of Chicago converted its food service for general diets to a frozen convenience system.[21] In 1967, Mr. Harvey Devine, Food Service Director for St. Mary's, found a supplier who could provide a line of bulk, frozen, precooked foods from which all visible fat was removed and no spices or seasonings added. These foods are used for modified diets, so that St. Mary's is now using a total convenience system. According to Beechler,[22] the Rahway Hospital (New Jersey) experienced a savings of $48,693.70 in food costs during the first year of using frozen prepared products for all meals, rather than conventionally prepared foods. Maddox[23] writes that most of the eighteen Kaiser Foundation Hospitals are using frozen prepared foods. Although the cost was high and selection poor when the program was first begun, the situation has improved. Labor savings now offset the higher food cost and a wide variety of products is available. According to Hartman[24] hospitals using convenience foods typically have experienced savings in space needs, equipment needs and labor needs.

A convenience food system, using frozen prepared foods, has been tested at the University of Maryland.[25] On a larger scale, the United States Army currently is exploring the possibility of reducing manpower

and skill requirements through use of convenience foods.[19]

Surveys conducted in 1966 by an organization of frozen food manufacturers and by "Institutions Magazine" indicated that although there was a trend towards the use of frozen prepared products in the food service industry, few operations were using them on a large scale.[14] Actually, the concept of convenience is not new. Some foods are convenient by nature, such as bananas or milk. Drying, milling, canning, and finally freezing have made natural foods more convenient. In the opinion of Harry Pope,[26] president of Pope's Cafeterias of St. Louis, what is new is the concept of using convenience foods to solve problems of increased food costs and lack of skilled employees. However, adapting frozen prepared convenience foods may not resolve these problems.

Thomas[27] writes that the Manchester (Connecticut) Memorial Hospital had to abandon its plan for conversion to frozen convenience foods. Deliveries of the products were irregular and the quality inconsistent. Meal costs went up and acceptance was not satisfactory.

According to Cherneff,[28] there is, to date, a general lack of quality and variety in some categories of frozen prepared foods. Buying is difficult, as there are no recognized specifications to use for determining quality levels. Cost of development, manufacturing, packaging, and merchandising make some convenience foods too expensive for general use. Retraining and reorganization of employees is necessary in order to actually realize savings in labor. Frozen foods by their nature can be a source of contamination unless handled carefully. Ryan[29] points out that there can be some inconvenience to bulk frozen products. For example, the 18-20 pound aluminum container takes four and one-half hours to heat. Large pouches can be difficult to remove from

boiling water. When frozen foods are reconstituted in the oven, the product is sometimes carmelized on the edges before the inside is heated. There is also a lack of standardization of equipment and packaging.

However, Pope[26] suggests that the convenience concept will be the key to rapid expansion of food service facilities in the future. He predicts that variety and quality of convenience foods will improve rapidly as sales volumes increase, and that costs will be lowered. Ryan[29] states that many failures in convenience food use can be attributed to lack of planning, and that with proper analysis and planning technique, frozen prepared foods can be integrated harmoniously into a system.

There are indications that efforts will be made to make frozen prepared foods more "convenient". In a speech prepared for the March, 1970, meeting of the newly formed National Association of Frozen Prepared Food Manufacturers, Dr. Vance Christian of Cornell University proposed that individual producers in the frozen prepared food industry should work with one type of consumer (such as school lunch, hospitals, or nursing homes). The particular needs of each type of consumer should be determined, and then used as a guideline for the manufacture of products designed especially for that segment of the consumer market. Ryan[29] recommends that a committee be formed by the food service industry to report on standards in packaging that could serve as a basis of uniformity for the manufacturers of frozen foods, and for the institutions that use them.

An operator's decision to use frozen prepared convenience foods should be based on consideration of quality, necessity, and cost.[30] Quality refers to overall acceptance and consistency. The foremost

necessity is related to lack of qualified personnel. Cost is based on the concept of escapable costs only. Wrisley[30] points out that existing storage and equipment is not relevant, nor is labor, unless it actually can be eliminated: In existing operations, only two classes of cost can be considered: food cost and labor cost. Wrisley states:

> .....food service operators must isolate item costs to make direct comparisons between convenience and premise-made items. The literature is replete with references to item food and item labor costs, as if these costs were commonly used. Unfortunately, this is simply not so. Although the calculation of the food cost for a premise-made item is not a complex task, it is a tedious one. Very few operators know all of the individual item costs....calculating item labor costs is something else again. A close approximation can be reached only through use of sophisticated time study techniques. Very few published studies deal with item escapable costs, including labor. As the determination of these costs is a time-consuming, expensive undertaking.... the rarity of this type of study should not be surprising. There is need for more research of this type in the industry.

At Purdue University, Quam, Fitszimmons and Godfrey[31] measured total labor and food costs in comparing the use of five ready-prepared foods and five similar conventionally prepared foods. Taste panels were used to determine acceptability of the convenience products as compared with those which were prepared conventionally. Results showed that the savings in labor costs were not sufficient to compensate for their added food costs. There was no significant difference in the acceptability of the two types of product.

In a study conducted by Price Waterhouse and Company in the Lankenau Hospital, Philadelphia, Pennsylvania, direct costs under normal and convenience food operation were compared. Results showed net decrease in combined food and labor costs when convenience products were used.[32]

A case study was cited by Dungan and Lacy[19] in which Christian compared six-month food and payroll costs for conventional and convenience

entrees utilized by a hotel. No results were cited. It was pointed out that a problem exist with all such studies which attempt to compare convenience foods to conventionally prepared foods in economic terms. It is that a totally acceptable technique for making the comparison has not been evolved. Different measurement techniques were used in each of the case studies cited.

In a more recent study done at Iowa University Hospital, a comparison was made of the food and labor costs incurred in the preparation of three types of entrees: conventional preparations, semi-convenience preparations, and frozen convenience products.(33) Mrs. Ann Crowley, Director of Dietetics, University Hospital, conducted the research on four entrees. Using prices prevalent in Iowa City, Iowa, the ingredients used in the semi-convenience preparations, and the frozen prepared entrees were costed and compared. Time studies were conducted to determine labor time (required to prepare) each of the conventional, semi-convenience, and convenience entrees. Labor hours were multiplied by the prevailing wage rate for cooks to determine labor cost. Dietetic interns prepared the entrees and conducted the time studies. Results showed the semi-convenience method of preparation to be the least expensive for all four of the entrees studied. There was little difference in the combined food and labor cost of the conventionally prepared entrees and similar frozen convenience products. No evaluation of acceptance was made.

According to correspondence with Mrs. Margaret H. Benton, Director of Food Services, Denver Public Schools, a pilot study is being planned in two of the Denver Schools in order to evaluate convenience products. To date, frozen convenience products have not been used in Denver's

school lunch program because of the necessity for greater frozen food storage areas, and/or more frequent deliveries. Mrs. Benton also states that scheduling of labor, and the current failure of some convenience foods to consistently meet standards of the school lunch program are two other factors which have delayed incorporation of convenience foods in the Denver School Lunch Program.

A meaningful evaluation of convenience foods must include consideration of quality, as well as a cost analysis. Wrisley's[30] concept of quality, consistency and overall acceptance, can be the basis for this evaluation. A judgment as to consistency must be made over a period of time.

Vawter and Konishi,[34] United States Army Medical Nutrition Laboratory, give a definition of food acceptability as being "a question of which foods shall be eaten". In research by Vawter and Konishi, the acceptability of 170 foods was evaluated by the quantification of the actual foods consumed under an ad libitum intake study. The subjects were allowed unlimited quantities of the available foods. As the foods were served, the weight of each item taken by each subject was recorded. The food trays were collected after each meal and the scrapings on each tray were weighed and recorded by food items. The consumption of each food item was then obtained by subtracting the scrapings from the total weight served. The acceptability of the foods was measured by their consumption.

Terms

In investigating the possibility of using convenience foods in Army Field Feeding Operations, Dungan and Lacey[19], found that there

was little agreement in the food service industry on a definition of convenience foods. An acceptable definition is necessary to give a basis of comparability to case studies involving the use of convenience products. A survey of food service literature was made, and the following definition was formulated:

> A convenience food is a menu item in a preserved state that, with objective finishing instructions, allows the serving of that menu item without need for a skilled cook or baker to assure customer acceptance of that item.

This definition will be used for the purpose of this research. The term "conventional" will be applied to products prepared in the school lunch facility using a standardized recipe.

CHAPTER III

METHOD OF PROCEDURE

This research was stimulated by the interest of a manufacturer of frozen convenience entrees and by the director of a school lunch food service. To make preliminary plans, meetings were held with a representative of a frozen convenience food manufacturing company, and with the Director of Food Services for the Midwest City-Del City School District, in Oklahoma. The purpose was to explore methods for evaluating frozen convenience entrees for use in a school lunch program. As a result of these conferences, a research project was scheduled for the fall of 1969, during which several frozen convenience entrees would be evaluated in the lunch program of a school in Del City, Oklahoma. The convenience entrees were to be compared to similar conventional entrees in terms of cost, labor requirements and acceptability. A pilot study would precede the research project, in the spring of 1969, to help in developing a method of procedure.

In the conferences, the School Lunch Director, Mrs. Helen McGee, selected Del Crest Junior High as the site of the research project. Del City is a community of 60,000 adjacent to Oklahoma City. The twenty-four schools which comprise the Midwest City-Del City School System, serve 18,000 elementary and secondary pupils. The school district use traditional methods of operation, and participates in the National School Lunch Program. A six-week cycle menu is used.

Several factors influenced the choice of Del Crest Junior High for the research project. One consideration was the rate of participation in the school lunch program. Pupils attending D.C.J.H. are required to eat lunch at school, so participation is almost 100%. During the school year of 1968-1969, approximately 660 Type A lunches were served each day between 11:00 a.m. and 12:00 o'clock.

Another factor in the choice of a site was the school lunch staff. At D.C.J.H., the staff is especially cooperative and experienced. For example, the main dish cook has worked in school lunch for ten years. Also, a research project conducted in the D.C.J.H. cafeteria during 1969 had provided the staff with a previous experience of working under research limitations.

An additional factor in the choice of D.C.J.H. was its modern equipment and facilities. The school itself was built in 1962, and its cafeteria was completed in 1967, at which time, all new equipment was installed. Kitchen equipment is listed in Table I. Serving equipment includes two electric counters, each with five openings. A built-in milk cooler is located between the counters. The floor plan of the kitchen and serving areas is shown in Figure 1.

To assist in the research, the frozen food manufacturer agreed to provide samples of four entrees, one of which would be selected for use in the pilot project. Mrs. McGee and the author evaluated the samples on the basis of palatability and appropriateness for school lunch. Spaghetti and meat sauce was the entree selected for the pilot study, as it is a menu item served regularly for school lunch, is well-liked by the students, and the convenience version was considered relatively inexpensive for future purchase, if deemed advisable.

TABLE I

DEL CREST JUNIOR HIGH SCHOOL

CAFETERIA EQUIPMENT

EQUIPMENT	MANUFACTURER	CAPACITY
Walk-in refrigerator	Bally	8'x7' (20 shelves)
Walk-in freezer	Bally	6'x7' (15 shelves)
Steam-jacketed kettle	Steam-Chef	40 gallon
Steamer	Steam-Chef	16 pan
Range/oven	South Bend	6 burner
Double convection oven	Montague	10 racks
Mixer	Hobart	H-600
Slicer	Hobart	
Potato Peeler	General Electric	
Pass-through refrigerator	Koch	2 compartments
Pass-through oven	Koch	2 compartments
Dishwasher	Hobart	C-44
Dish return		55 compartments (7')

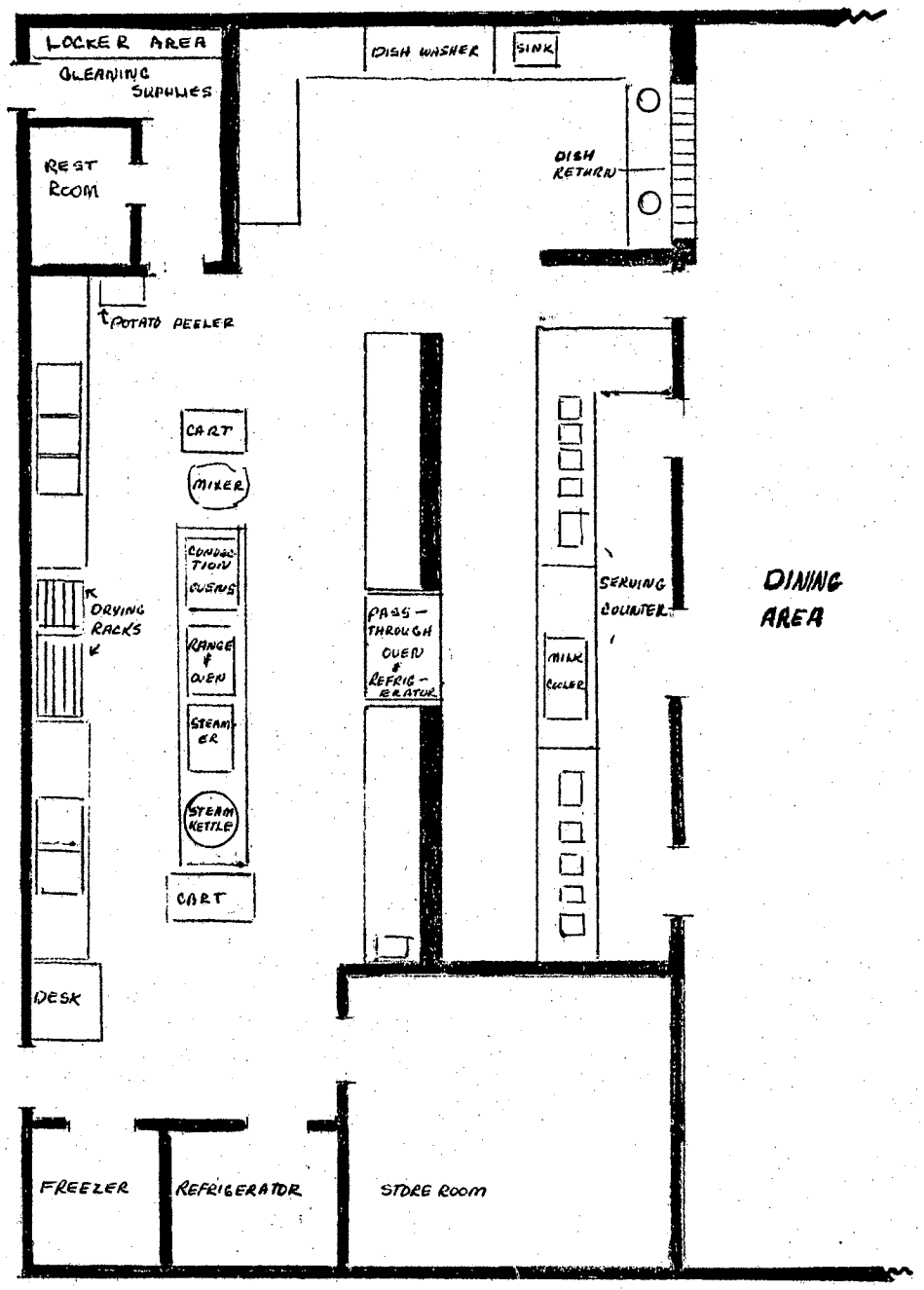

Figure 1. Floor Plan of Del Crest Junior High School Cafeteria

On the Del Crest standardized recipe for spaghetti and meat sauce, the serving size indicated for junior high school students is 3/4 cup. Three-fourths cup of the convenience spaghetti and meat sauce was found to weigh six ounces, and would provide one and one-fourth ounces of cooked beef, according to the manufacturer's ingredients analysis. Therefore on the day the convenience spaghetti and meat sauce was served, an additional three-fourths ounce of protein needed to be provided in the menu to fulfill Type A requirements. Protein outside of the entree is often provided in a form such as egg used as a garnish or in the dessert, a peanut butter cookie or a cheese stick.

In order for the author to become acquainted with the staff, and with the general procedures involved in preparation of the entree, the D.C.J.H. lunch facility was visited on a day when spaghetti and meat sauce was prepared. Meanwhile, a statistician was consulted, further procedures for the research were formulated, and a meeting was held with the Del Crest school lunch staff to explain the methods to be used. For the pilot study, the following procedure was decided upon.

Pilot Study

The conventional entree would be tested first, on a day when spaghetti and meat sauce normally occurred in the cycle menu. The next time spaghetti and meat sauce was to be served, according to the menu, the convenience product would be used and evaluated. Food and labor cost, labor time requirements, and student acceptance would be determined for both products, and the results compared.

To obtain food cost of the conventional entree, the standardized recipe would be costed, using current prices quoted by suppliers in the

Oklahoma City area. In costing the recipes, the assumption would be that no commodity ingredients were used. It would be impossible to predict to what extent commodities might be substituted for purchased ingredients in a given school lunch program on any particular day. For the convenience entree, food cost would be computed, using the price of the entree as regularly quoted by the supplier for the quantity purchased.

Labor requirements would include the hours of labor required for the school lunch cook to prepare the entree, and the dollar cost of labor used. To determine labor requirements, time studies would be made of all activities related to preparation of the entree. These would include:

1. assembling supplies and equipment,
2. preparation of menu items, including pre-preparation on the day before the product would be served, procedures necessary for storing the product overnight, final preparation and cooking on the day the entree is served, transfer of the product to steam table pans for serving, and
3. clean-up of area, utensils and equipment used in preparation of the entree.

On the above basis, the total number of labor hours would be calculated, and multiplied by the wage paid to the main dish cook to obtain the dollar cost of labor used in preparing the entree. The figure used for wages would include fringe benefits.

To compare acceptance of the convenience and conventional entrees, a plate waste study would be conducted. Plate waste would be expressed in terms of per cent, by weight, of the total product served.

Determination would be as follows: Each of the pans from which the entree is to be served will be weighed before it is filled, and the weight recorded. After the pan is filled with the cooked entree, it will be weighed again, and the weight of the empty pan subtracted from the total weight to obtain weight of cooked product contained in the pan. The same procedure will be followed for each pan. Weights will be totaled to obtain total yield. After serving, the leftover product will be weighed and this amount subtracted from total yield to arrive at total weight served. Also, plate waste will be collected and weighed, and the ratio of plate waste to total product served will be calculated.

During the 1968-1969 school year, the daily entree was prepared for D.C.J.H. in a quantity to serve 660. Three-fourths cup of the conventional spaghetti and meat sauce was found to weigh five ounces, while three-fourths cup of the convenience entree weighed six ounces. On this mathematical basis, 206 pounds and four ounces of the conventional product, and 252 pounds of the convenience entree would be required to serve 660.

During the pilot study, it was discovered that the entree was portioned with large spoons, rather than with accurate dippers. The result was that the total product served varied somewhat from the amount calculated to be necessary for the indicated three-fourths cup serving. In addition, the servings (actually given) of the conventional spaghetti and meat sauce were not equivalent to those of the convenience product. Therefore, a meaningful comparison of actual costs and acceptance could not be made.

Research Procedure

While portion control is important in a food service institution, minimal deviation from an indicated serving size can be tolerated. However, for this research it was deemed necessary to control serving sizes so that equivalent servings would be given of the convenience and conventional products. Generally, in a school cafeteria, meals must be served very quickly (at D.C.J.H. 660 persons are served in one hour). For this reason an extremely high degree of accuracy in portioning bulk products for this research was considered not to be practicable. Based on the experience of the pilot study, a decision was made to use pre-portioned entrees for the research rather than bulk products. When considering the cost of an entree for school lunch, the amount of cooked protein per serving is as important as is the serving size. By doing the research using pre-portioned products, the serving size could be controlled, the amount of protein per serving established, and the comparison of costs and acceptance presented on a more relevant basis.

The comparison of costs will be made on the basis of cost per serving, rather than cost per ounce. A comparison made on the basis of cost per ounce can be misleading unless the convenience entree should happen to contain the same percentage of protein per ounce as does the conventional entree. An attempt was made to select convenience entrees for this research which would make an adequate contribution of protein to the menu. Where contribution of protein is not equal for the convenience and conventional entrees, the discrepancy will be considered in the discussion of costs.

Three entrees were selected from the school lunch cycle menu to be used in the research project: hamburger patties, chicken fried steak, and corn dogs (a frankfurter coated with a cornbread batter and deepfat fried). All three of these entrees are available frozen and precooked, are well-liked by students, normally prepared conventionally in the school lunch facility, and all could be evaluated easily in a plate waste study. Samples of these entrees were obtained from suppliers in the Oklahoma City area. Two brands for each entree were found to be available in an acceptable price range. The final choice of products to be used in the research was made by the author and Mrs. McGee on the basis of protein content, palatability and cost.

The frozen convenience hamburger pattie selected was a two-ounce "charburger" sold by a distributor for 8.8 cents per serving. A chicken fried steak was selected which was available from a local manufacturer. A two and two-thirds ounce steak costing ten cents per serving is the size normally purchased for school lunch programs according to information from the manufacturer. It was decided to use a 3.2 ounce steak costing 12.6 cents per serving, for the research, in order that the protein content of the convenience product would be more nearly equal to that of the conventional preparation.

The corn dog selected also was available from a local manufacturer. The cost of a 3.3 ounce corn dog made with a 1¼ ounce frank was 10 cents. Convenience corn dogs also were available at the same cost, made with one ounce franks. Two conventionally prepared corn dogs, made with one ounce franks, were used per serving in the D.C.J.H. lunch program. It was decided that the cost of serving two convenience corn dogs per serving would be prohibitive. Therefore, one convenience corn dog

(containing the 1¼ ounce frank) would be used per serving, and additional protein would be provided elsewhere in the menu. Appendix A contains a listing of ingredients for the entrees used in the research.

After the entrees had been selected, the schedule for the research project was planned by the author and Mrs. McGee. The project was to be scheduled between September 1, 1969 and January 31, 1970. Within this time, the number of repetitions of each entree was limited primarily by the necessity of avoiding excessive repetition in the school lunch menu, as well as by considerations of cost and time. Therefore, it was decided to serve each conventional entree and each convenience entree three times, the minimum number required for statistically valid results. No changes were necessary in the D.C.J.H. cycle menu in order to schedule corn dogs and hamburgers a total of six times each within the research period. However, chicken fried steak would normally have been served only three times between September 1 and January 31; therefore, the menu was changed in order that chicken fried steak could be served at three additional meals. (See Table II for schedule). A copy of the research schedule was given to the D.C.J.H. School lunch office so that needed convenience products could be ordered through normal procedures. One will be given to the kitchen manager at D.C.J.H. so that work schedule could be adapted to accommodate the convenience products.

Procedures developed for the pilot study were used in the actual research for comparison of food and labor costs. However, the decision to use pre-portioned entrees for the research project rather than bulk products necessitated a change in the procedures used for the acceptance study. As in the pilot study, plate waste was expressed as a percentage of total entree used. For determination of total weight served,

TABLE II

RESEARCH SCHEDULE FOR EVALUATION OF ENTREES

Week Of Menu Cycle	Month	Day of the Week					Entree
		Mon	Tues	Wed	Thur	Fri	
3	Sept.		16				Hamburger Patties
4					25		Chicken Fried Steak
5			30				Corn Dogs
6	Oct.		7				Chicken Fried Steak
1				15			Hamburger Patties
2			21				Corn Dogs
3			28				*Hamburger Patties
4	Nov.		4				Chicken Fried Steak
						7	*Hamburger Patties
5			11				*Corn Dogs
6			18				*Chicken Fried Steak
2	Dec.		2				*Corn Dogs
3			9				Hamburger Patties
4			16				*Chicken Fried Steak
5	Jan.		6				Corn Dogs
6		12					*Hamburger Patties
			13				*Chicken Fried Steak
2						30	*Corn Dogs

*Convenience entrees

the number of servings prepared was counted as the product was transferred into pans for serving. In addition, the total weight of the prepared product was obtained, as in the pilot study, and was divided by the number of servings to determine average weight per serving. The total weight served was ascertained by multiplying the number served by the average weight per serving, and verified by observation of leftover product. For corn dogs, the weight of the wooden stick used in the commercially prepared product was determined and subtracted from the weight of the corn dog.

Other changes causing variance from the pilot study were school enrollment and the wage rate paid to the main dish cook. Enrollment at D.C.J.H. for the 1969-1970 school year dropped slightly from the year before, so that the average number of meals served each day was 650. The wage rate, including fringe benefits, was increased to $1.86 per hour. (See Table III for wage computation.)

Statistical procedure to be employed was the analysis of variance technique. Special equipment to be used by the author was as follows:

Hansen Scale, Model 2000

Meylon Stopwatch, #208A

Clipboard

Large Dishpan

Rubber Scraper

TABLE III

WAGE COMPUTATION

Base Hourly Salary		$1.62
Hourly Benefits (12.8% of Base)		0.207
Social Security (4.8% of Base)		
Personal and Sick Leave (5 2/3% of Base)		
Workman's Compensation (2 1/3% of Base)		
Daily Benefits		0.0373
Lunch	$.25	
Apron	.03	
	$.28 ÷ 7.5 hours/day = $.0373/hour	
TOTAL Hourly Wage		$1.8643

CHAPTER IV

RESULTS

A complete presentation of the research data will be found in Appendix B. Food and labor costs for the convenience and conventional entrees are shown on a cost per serving basis and also on the basis of 650 servings, the quantity prepared in the D.C.J.H. school lunch program. The costs for 650 servings are listed in order to show a meaningful comparison of the costs involved for a quantity preparation.

Results of the research indicate that there was very little difference between the convenience entrees, on the average, and the conventional preparation, in terms of combined food and labor cost and student acceptance. As shown in a statistical analysis which will follow, differences which did result were not significant.

The comparisons of food costs, labor costs, and combined food and labor costs are given in Table IV. Appendix C contains the costed standardized recipes used for the conventional products. Labor costs are based on wage computations in Table III. Figures 2, 3, and 4 are a graphic presentation of the comparisons of food costs, labor costs, and combined costs respectively.

As was expected, food costs were somewhat higher for the convenience products than for the conventional preparations. (See Table IV, Figure 2). The average differences in food cost between convenience and conventional preparation was $.02383 per serving. The convenience

TABLE IV

COMPARISON OF AVERAGE FOOD COST, LABOR COST AND COMBINED COSTS PER SERVING OF CONVENIENCE VS CONVENTIONAL ENTREES

Costs	CONVENIENCE			CONVENTIONAL			DIFFERENCE IN COST *		
	Food	Labor	Total	Food	Labor	Total	Food	Labor	Total
Chicken Fried Steak	$.1260	.00557	.13157	$.0868	.01917	.10597	$.0392	(.01360)	.02560
Corn Dogs	.1000	.00217	.10217	.0692	.02210	.09130	.0308	(.01993)	.01087
Hamburger Patties	.0880	.00163	.08963	.0865	.01487	.10137	.0015	(.01324)	(.01174)
Averages	.10467	.00312	.10779	.08083	.01871	.09955	.02383	(.01559)	.00824

*Where the cost for convenience entrees is less than for conventional, the difference is shown in parenthesis.

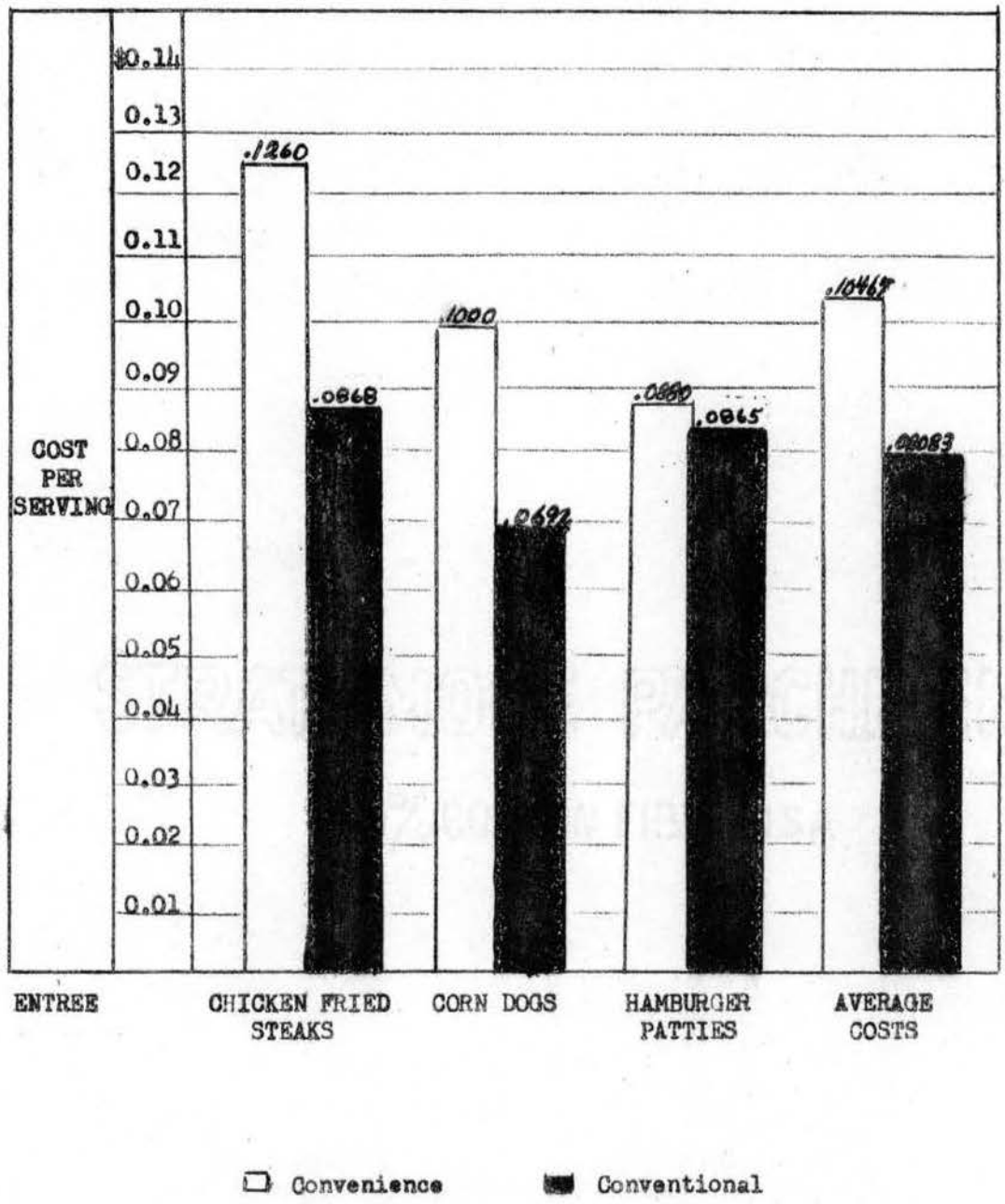

Figure 2. Food Cost Per Serving of Convenience vs Conventional Entrees

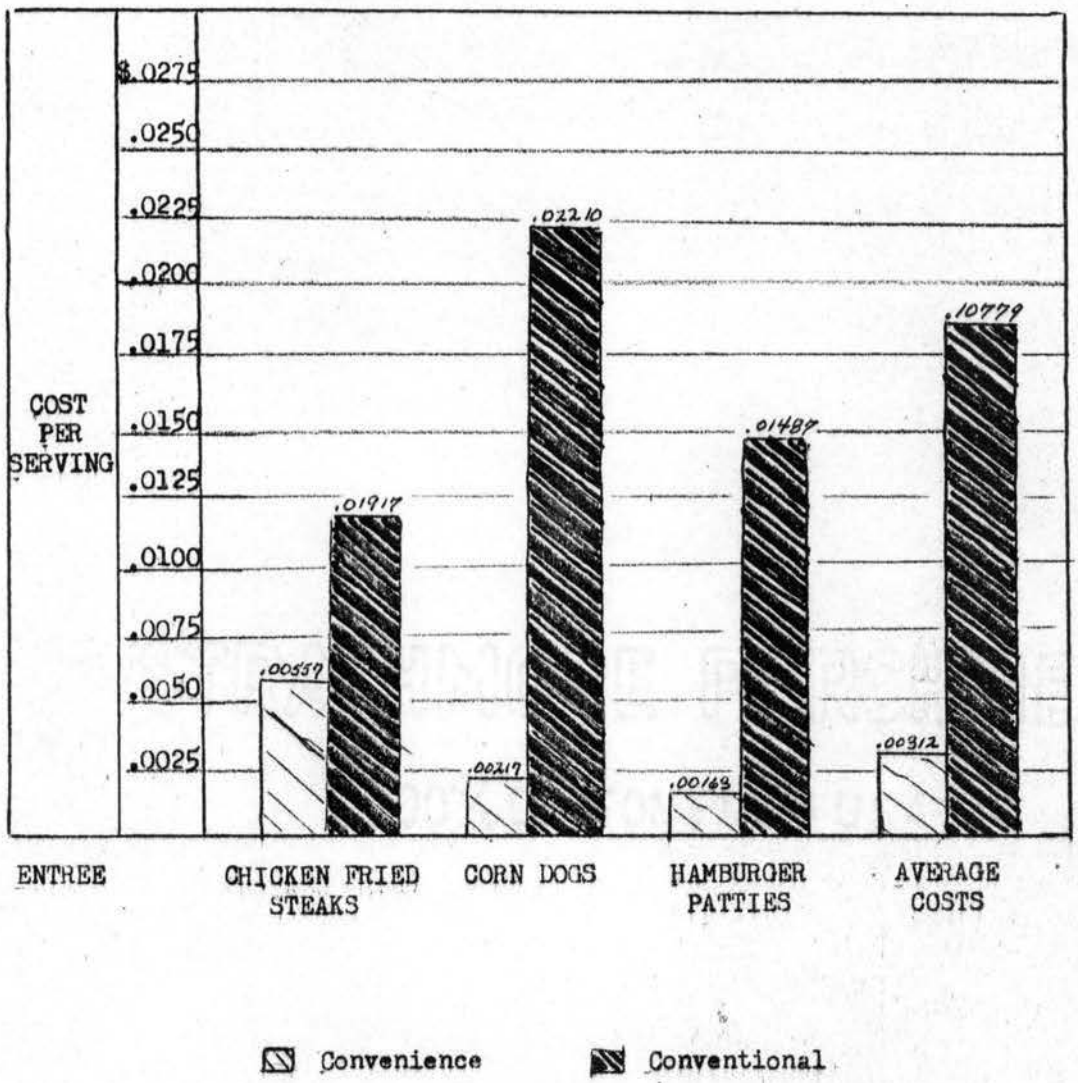

Figure 3. Labor Cost Per Serving of Convenience vs Conventional Entrees

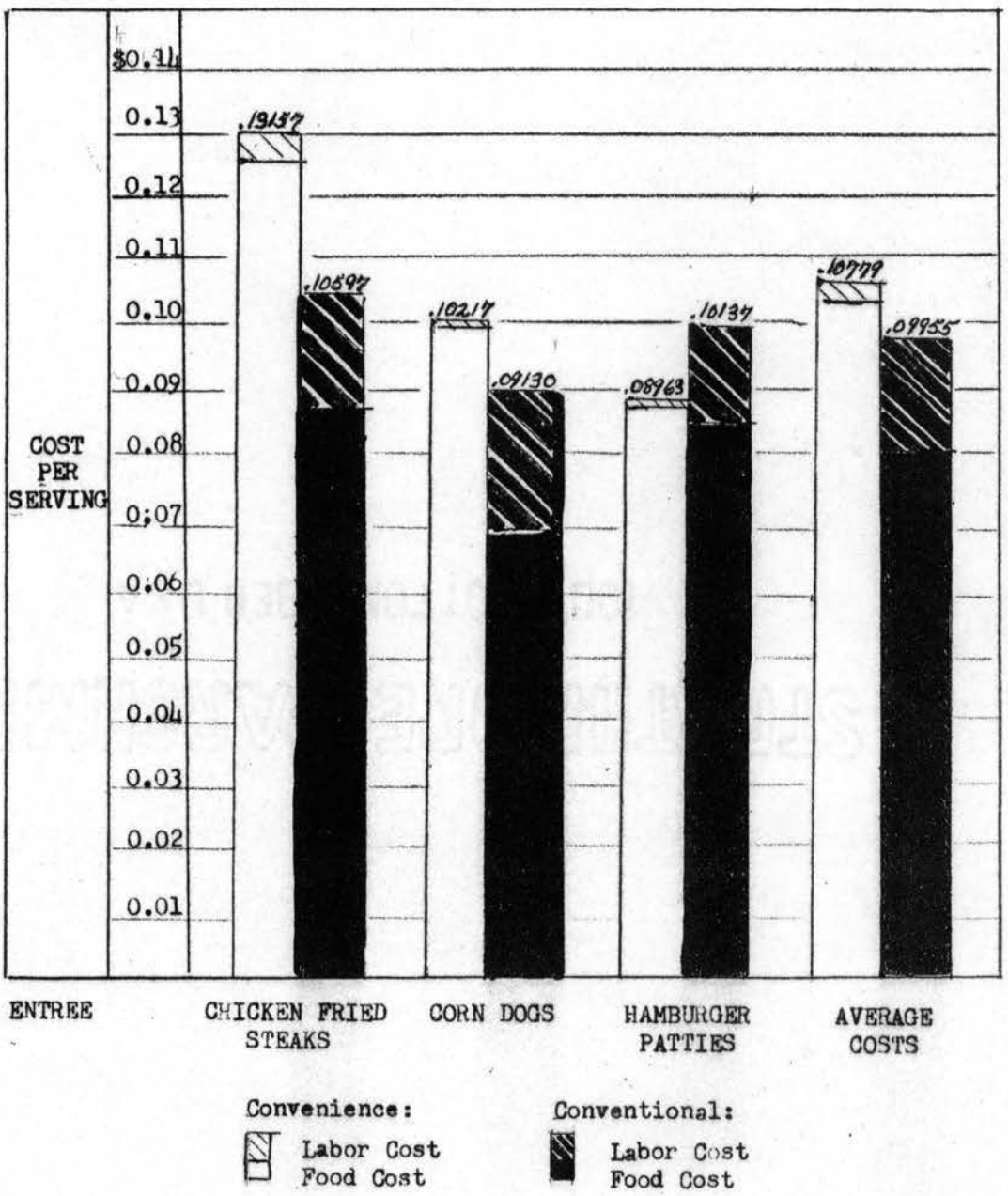

Figure 4. Combined Food and Labor Costs of Convenience vs Conventional Entrees

preparation had an average food cost of $.10467 per serving, while the average food cost per serving for conventional product was $.08083.

Labor costs were predictably less for the convenience products than the conventionally prepared entrees. (Table IV, Figure 3). The average difference was $.01559; the average labor cost for convenience products being $.00312, and for conventional products, $.01871.

The relatively greater amount of labor required to prepare the three conventional entrees resulted in a combined food and labor cost for convenience entrees which was only slightly greater than the cost of conventional preparation (Table IV, Figure 4). The average difference in combined food and labor costs between convenience and conventional preparation ($.00824 per serving) was found to be not statistically significant as shown in Table V.

Table V shows combined costs based on 650 servings for each of the experimental sessions. The analysis of variance technique was used for testing the null hypothesis that the average cost of 650 servings is the same for the convenience and conventional preparations against the alternative that average costs differ. This analysis is presented in Table VI. The ratio F=0.575 is found to be far from significant when compared to the tabulated F-distribution having 1 and 2 degrees of freedom at any conceivable level of significance.

A comparison of the average plate waste for each entree is presented in Table VII, and shown graphically in Figure 5. Table VII also contains the average cooked weight per serving for convenience vs conventional preparations. As was true for combined food and labor costs, the difference in plate waste for convenience vs conventional entrees was not significant. Average plate waste for convenience products was

TABLE V

COMBINED COSTS/650 SERVINGS

		Convenience	Conventional	Entree Total
Corn Dogs	1	66.820	60.255	
	2	66.170	58.435	
	3	66.246	59.345	
		199.236	178.035	377.271
Hamburger Patties	1	58.240	66.625	
	2	58.305	66.430	
	3	58.214	64.610	
		174.759	197.665	372.424
Chicken Fried Steak	1	85.215	69.940	
	2	85.475	68.640	
	3	85.865	68.120	
		256.555	206.700	463.255
Y.j.		630.550	582.400	1212.950

TABLE VI

ANALYSIS OF VARIANCE FOR COMBINED COSTS

S. V.	d.f.	S.S.	M.S.	F
Entree	2	870.3896	435.1948	
Preparations	1	128.8013	128.8013	0.575
Exp. Error	2	447.8134	223.9067	
Samp. Error	12	6.3551	0.5296	
TOTAL	17	1453.3594		

TABLE VII

COMPARISON OF AVERAGE COOKED WEIGHT PER SERVING
AND AVERAGE PLATE WASTE FOR CONVENIENCE
VS CONVENTIONAL ENTREES

Entree		Convenience	Conventional	Difference*
Chicken Fried Steak	Cooked weight per serving	2.987oz	2.597oz	(.390oz)
	Plate waste	15.17%	13.55%	1.62%
Corn Dogs	Cooked weight per serving	3.313oz	3.677oz	.364oz
	Plate waste	7.52%	6.93%	.59%
Hamburger Patties	Cooked weight per serving	1.967oz	2.173oz	.206oz
	Plate waste	11.81%	8.64%	3.17%
Averages for 3 Entrees	Cooked weight per serving	2.756oz	2.816oz	.06oz
	Plate waste	11.50%	9.71%	1.79%

*Where the cooked weight for the convenience product is greater than that of the conventional product, the difference is shown in parenthesis.

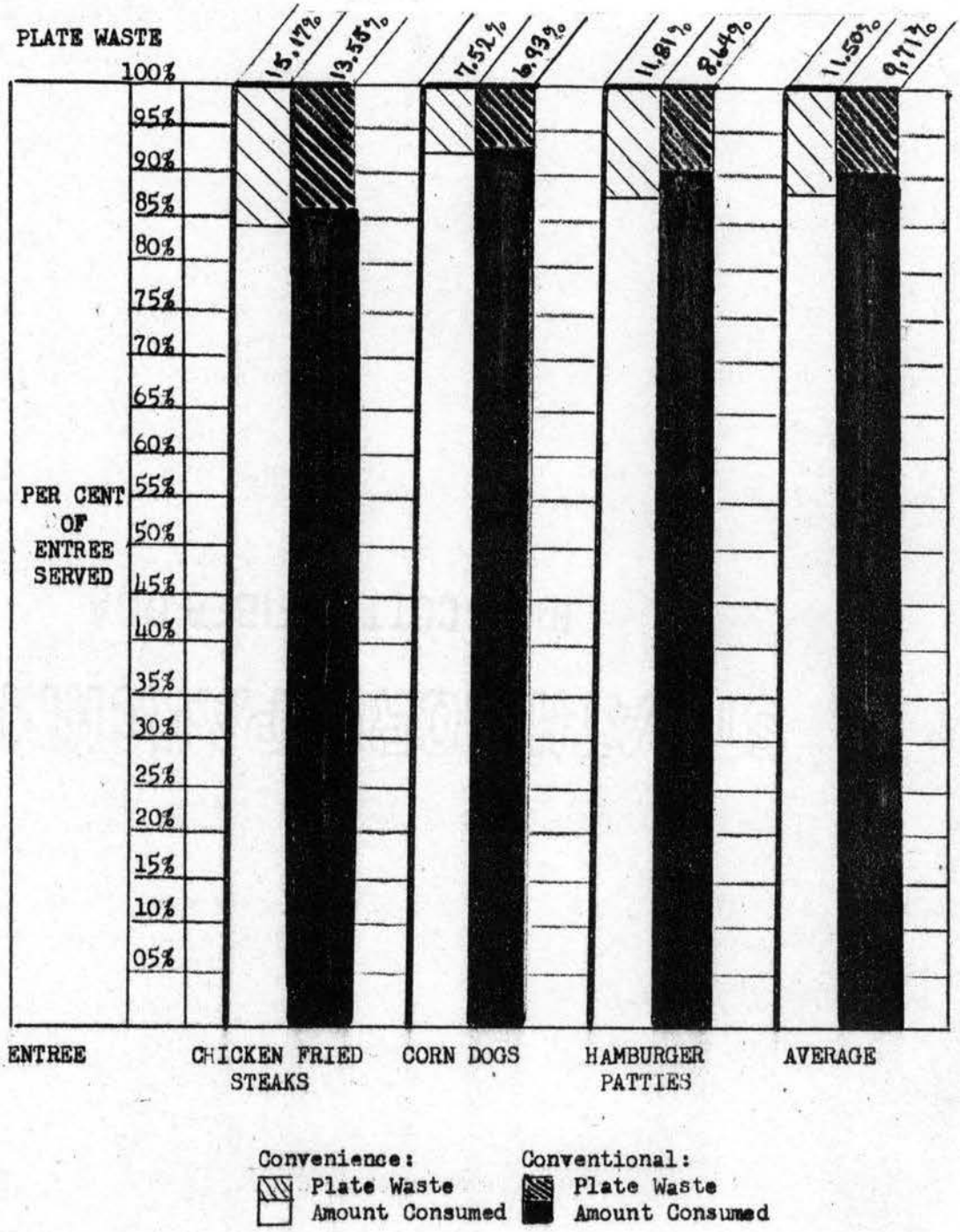

Figure 5. Plate Waste For Convenience vs Conventional Entrees

11.5%, and for conventional products it was 9.71%, a difference of 1.79%.

Table VIII shows the plate waste in pounds per one hundred pounds served (waste as % of weight served) for each of the experimental sessions. The analysis of variance technique was used to test the null hypothesis that the average waste is the same for convenience and conventional preparations against the alternative that average wastes differ. This analysis is presented in Table IX. The ratio F=6.035 is not significant when compared to the tabulated F-distribution having 1 and 2 degrees of freedom for any level of significance less than or equal to 0.10.

TABLE VIII

PLATE WASTE IN POUNDS/100 POUNDS SERVED
(WASTE AS % OF WEIGHT SERVED)

		Convenience	Conventional	Entree Total
Corn Dogs	1	9.00	7.70	
	2	5.66	3.67	
	3	7.91	9.43	
	Y1j.	22.57	20.80	43.37
Hamburger Patties	1	11.64	6.96	
	2	13.34	9.12	
	3	10.45	9.85	
	Y2j.	35.43	25.93	61.36
Chicken Fried Steak	1	16.30	12.35	
	2	13.96	13.40	
	3	15.41	14.71	
	Y3j.	45.67	40.46	86.13
Y.j.		103.67	87.19	190.86

TABLE IX

ANALYSIS OF VARIANCE FOR PLATE WASTE

S. V.	d.f.	S.S.	M.S.	F
Entree	2	153.6450	76.823	
Preparations	1	15.0884	15.088	6.035
Exp. Error	2	4.9995	2.500	
Samp. Error	12	37.5949	3.133	
TOTAL	17	211.3278		

CHAPTER V

INTERPRETATION OF RESULTS

In evaluating the cost comparisons made in this research, a number of factors must be considered. Of first importance is the amount of cooked protein per serving provided by the convenience product as compared with the conventional. For Type A lunch, the entrees prepared conventionally do not always provide the full two ounces of required protein. Type A specifications allow the protein requirement to be met by the entree and one other menu item. In elementary schools, a 10% leeway is allowed in the protein requirement, so that a minimum of 1.8 ounces is required, per child.

Of the six entrees evaluated in this research, the convenience hamburger pattie was found to have the lowest combined food and labor cost. Its combined cost per serving was $0.08963, $0.01174 less than that of the conventionally prepared, which cost $0.10137 per serving. The conventional hamburger pattie prepared in the D.C.J.H. school cafeteria provides slightly more than two ounces of cooked protein, in the form of beef, split peas, eggs, and NFD milk. Bread crumbs, water and seasonings are also added. The convenience pattie contains beef and two soy derivatives (soy grits and hydrolyzed vegetable protein) as sources of protein, plus water, onions, and seasonings. At present, however, only the beef can be considered in the computation of cooked protein for Type A school lunch, as government regulations do not allow the consideration

of soy protein in meeting protein requirements. At this time, efforts are being made to explore the possibility of setting standards for inclusion of soy derivatives for Type A lunch requirements.

Meanwhile, the convenience hamburger pattie used in this research is considered to have a cooked protein content of 82.5%, which means that a two-ounce pattie is considered to provide only 1.65 ounces of cooked protein. (The meat content of convenience hamburger patties varies from product to product, usually in direct proportion to cost). In order to use the convenience hamburger evaluated in this research for a Type A lunch in a secondary school, additional protein must be provided in the menu. For example, a 0.35 ounce serving of cheese might be served with the pattie to make a cheeseburger, or separately, as a cheese stick. The additional food and labor cost of providing the cheese would then have to be considered in the comparison of the convenience and conventional products.

The combined cost differential for convenience vs conventional products was greatest for chicken fried steak ($0.02560/serving). The conventional product is made in the D.C.J.H. cafeteria by lightly coating a hamburger pattie (described in the previous discussion) with a flour and bread crumb mixture. The conventional chicken fried steak, therefore, has the same protein content as does the conventional hamburger, (2.07 ounces per serving), with a total average weight of 2.597 ounces. The convenience chicken fried steak weighs 3.2 ounces, as purchased. The product consists of a meat pattie weighing 2.4 ounces, with a layer of breading which weighs 0.8 ounces. Ingredients for the convenience breading are similar to the breading used for the conventional chicken fried steak. (See Appendix A).

As is true of the convenience hamburger pattie, the meat pattie used in the convenience chicken fried steak is made from beef and soy derivatives (soy protein concentrate and hydrolyzed vegetable protein). The product also contains non-fat dry milk solids and non-protein ingredients: water, onions, dextrose and seasonings. The beef content of the pattie is approximately 75%. Since beef is the only accepted source of protein according to government regulations, the contribution of cooked protein is 1.8 ounces per pattie. To use this product for Type A lunch in a secondary school, an additional 0.2 ounces of protein would need to be provided in the menu, and the additional cost considered when comparing the product with a conventional entree. For example, peanut butter cookies could be served for dessert, cheese sauce on a vegetable, or extra eggs and cheese could be used in the bread.

The difference between convenience and conventional corn dogs (in combined food and labor cost) was $0.01087 per serving. "All meat" frankfurters are considered in Type A school lunch programs to be 100% protein. Two, one-ounce franks were used for the conventional serving and weighed 3.677 ounces per serving when made into corn dogs. The convenience product weighed 3.313 ounces per serving and consisted of one corn dog made with a one and one-quarter ounce frank. For a Type A lunch in a secondary school, the convenience corn dog lacks three-fourths ounce of the required protein. This deficit could be made up by serving a half deviled egg or a three-fourths ounce cheese stick, the cost of which would have to be considered when comparing the convenience and conventional products.

Another factor to consider when comparing the cost of convenience and conventional entrees is the extent to which commodity foods are

available and could be used to reduce the cost of conventionally prepared entrees. This consideration is relevant only if convenience products were to replace a large percentage of the items on a school lunch menu, so that full use could not be made of available commodity supplies. If convenience items were to be used only occasionally, commodities could be used on days when conventioned products were prepared.

Several additional factors should be considered in the interpretation of the labor cost comparisons made in this research. The number of labor hours spent in preparation of the convenience entrees was relatively low. However, in the case of the chicken fried steak and the corn dogs, the time should probably have been further reduced. Both of these products were heated in one type of pan, and then transferred to counter pans for serving. The necessity of handling the product twice merely to accomplish heating it, is questionable, and was probably due to lack of familiarity with the products on the part of the cooks. Convenience hamburger patties had been used in the D.C.J.H. school lunch previous to this research, and the method used for heating this product was more economical. The patties were placed in a shingle arrangement in counter pans, while still frozen, and then heated and served from the same pans.

In this research, labor costs for the convenience and conventional entrees were based on calculations of the time required to prepare 650 servings. With pre-portioned conventional entrees, a certain percentage of the labor cost for one day's preparation will vary directly with the number of servings prepared. This is because of the individual handling required for each serving, such as forming each hamburger pattie or chicken fried steak, or deep-fat frying each corn dog. However, there are work elements involved in the preparation of conventional entrees

which will remain relatively constant (within limits) although the total number of prepared servings varies. Mixing a large amount of meat mixture for hamburger patties will take approximately the same amount of time as mixing a smaller amount. Therefore, the labor cost per serving would tend to be greater for the conventional entries when prepared in amounts of less than 650 servings. Labor time required for heating convenience entrees (opening and emptying boxes, placing pans of product in the oven and removing them, washing pans used to heat the product) will vary directly with the number of servings prepared. Thus the labor cost per serving reported in this research would not be expected to be greater for preparation of smaller quantities of convenience product. In other words, as quantities are decreased, the labor cost per serving for conventional entrees would tend to become greater, while for convenience entrees, the cost would tend to remain constant.

Labor cost is also a function of wage level. In areas of the United States where wage levels are substantially higher or lower than in Oklahoma City, labor costs could alter considerably the cost comparison between the convenience and conventional entrees. When wage levels are much lower, the convenience entrees would become relatively more expensive; where wages are higher, the convenience entrees would be found to be relatively more economical.

A labor cost not considered in this research was the cost of labor turnover. If enough labor were eliminated through the use of convenience foods, to decrease the number of employees required in a school lunch operation, this might be considered a possible savings in labor costs. To realize this savings, a substantial number of convenience products would need to be utilized.

Finally, labor cost savings are not relevant unless the employee's work schedules are adjusted so that the reduction in required labor hours and subsequent labor cost savings are realized. It is obvious that when employees are not trained to use the most efficient methods possible in preparing convenience foods, much of their value in reducing labor costs is lost. Also, proper scheduling is necessary when convenience foods are used to prevent a natural tendency to compensate for a reduced job load, rather than increasing the amount of production per labor hour. The differences in labor costs between convenience and conventional entrees tested in this research are relevant only if the saved labor hours are used to increase overall production, or eliminated by reducing the number of labor hours on the payroll.

Results of the plate waste study showed that there was no significant difference in the acceptance of the convenience and conventional entrees tested in this research (Table IX). The greatest difference in plate waste between convenience and conventional products occurred for the hamburger patties. The percentage of waste was 11.81% for the convenience patties, and 8.64% for the conventional patties, a difference of 3.17%. (Table VII) This may have been due to a difference in the texture of the two products. It is somewhat surprising that of the three entrees tested, the greatest differentiation between the convenience and conventional products was for the entree which lost its identity to the greatest extent when served. The hamburger patties were served on buns spread with mustard and accompanied by a tomato, onion and lettuce garnish, while the other two entrees were served ungarnished. (The convenience hamburger pattie was also the least expensive of all six entrees tested).

Difference in plate waste was smallest for convenience vs conventional corn dogs. The per cent plate waste for the convenience product was 7.52%, 0.59% greater than for conventional corn dogs, which had a plate waste of 6.93%. (Table VII) Because of cost considerations, the convenience serving for corn dogs was 0.364 ounces smaller than was the serving of the conventional entree. This may have resulted in a smaller difference in plate waste than that which would have been a true indication of the difference in acceptance of the two products. The kitchen staff expressed a preference for the conventionally prepared corn dogs, even though the work load was less with the convenience product. However, the staff ate lunch at 10:30 a.m., immediately after preparation of the day's meal was completed. Students were served between 11:00 a.m. and 12:00 noon. From 10:30 until 12:00, the prepared corn dogs were held in a pass-through oven. The conventional corn dog may have been more noticeably superior to the convenience product immediately after being deep fat fried, than it was after being held for thirty minutes or longer. Also, the convenience corn dog was served on a wooden stick, a feature which may have some appeal for students not shared by the kitchen staff.

Of the three entrees chosen for the research, the chicken fried steak was least popular, as indicated by the plate waste study. Results showed an insignificant difference in acceptance between the convenience and conventional products, however. Plate waste for the convenience chicken fried steak was 15.17%, while for the conventional product, it was 13.55%, a difference of 1.62%. (Table VII) Since the convenience chicken fried steak used for the research was a larger portion (3.2 ounces before heating) then normally purchased for secondary

schools, it is possible that the serving size was excessive. This may have resulted in an amount of plate waste greater than that which would indicate a true comparison of acceptance of the convenience vs conventional products. If soy protein were to be accepted as a source of protein for Type A lunch requirements, a smaller convenience chicken fried steak could be used at a lower cost, which would meet the Type A requirement for protein. This possibly would result in a lower percentage of plate waste for the convenience product.

It was observed by the author that the plate waste left from all six of the entrees used in this research was relatively low. The low plate waste for the conventional products might be accounted for by the fact that the main dish cook at D.C.J.H. is skilled and dependable. Thus, the conventional entrees prepared at the school are consistently well-prepared. The convenience entrees used for the research were selected with palatability as one consideration. One objection to the use of convenience entrees has been a lack of consistent quality. However, in school systems where skilled labor is not readily available, carefully selected convenience entrees might be used to improve the quality of school lunch menus. Also, the quality of convenience products should improve as producers take advantage of technological change and increased sales volume.

CHAPTER VI

SUMMARY AND CONCLUSIONS

In this research an attempt was made to develop a method for evaluating frozen convenience entrees for use in a school lunch program. An exploratory study was conducted in a school lunch facility in which three convenience entrees were compared with similar conventional entrees in terms of food costs, labor requirements, and acceptability. The three entrees used for the comparison were chicken fried steak, corn dogs and hamburger patties.

Selection of convenience products suitable for use in a school lunch program was made specifically on the basis of protein content, palatability and purchase price. In comparing the convenience and conventional products, labor requirements were determined by conducting time studies of the procedures involved in the preparation of each entree in the school lunch facility. Food and labor costs were computed, based on price and wage levels prevalent in Oklahoma. A plate waste study was conducted to compare student acceptance of the convenience vs conventional entrees.

Results showed no significant difference in the combined food and labor costs of the convenience vs conventional products. (Table VI) The potential savings in labor costs associated with the use of the convenience entrees were sufficient to compensate for their higher food cost. Similarly, the plate waste study resulted in no significant difference

in acceptance of the convenience entrees as compared with that of the conventional entrees. (Table IX) However, the convenience entrees tested did not provide the full amount of cooked meat necessary to meet protein requirements for a secondary school, Type A lunch. Therefore, in order to use these convenience entrees in a secondary school lunch program, and meet Type A lunch requirements, additional protein would need to be provided in the menu. An advantage to the convenience entrees might be that they could be used on days when there is a necessity to reduce the labor hours required for preparation of the menu.

In general, the decision to use convenience products in a food service institution should be based on considerations of necessity, quality and cost.(30) Necessity is relevant to the decision of whether or not to use convenience products at all, and to what extent they should be used. In areas of the United States where skilled labor is scarce, convenience entrees may be a solution to problems faced by school lunch programs. However, in areas where skilled labor is available, the use of convenience entrees may not be justified merely on the basis of the labor they save. Another reason for using convenience entrees is to provide variety in the school lunch menu. For example, certain entrees not easily prepared in the school lunch facility might be purchased in the form of a convenience food. One goal promoted by school lunch administrators is increased participation by students in the school lunch program. Obviously, the more attractive the school lunch menu, the greater will be the likelihood of increased participation.

Evaluation of specific convenience entrees for use in school lunch is based upon consideration of quality and cost. Quality refers to acceptability and consistency. Initial steps in evaluating acceptability

of a specific convenience entree involve sampling of the product, and analyzing its list of ingredients. To be suitable for school lunch, a convenience entree not only must be palatable and of desirable quality, but it must also contribute an appropriate amount of protein to the menu. It is necessary, therefore, to obtain information concerning the amount of cooked meat per serving provided by a convenience entree before a meaningful evaluation can be made. Convenience entrees vary widely in the per cent of cooked meat they contain, usually in direct proportion to their cost.

A convenience entree must also be acceptable to students in order to be suitable for school lunch. What is acceptable to students may differ somewhat from that which seems palatable and of good quality to those responsible for purchasing the product. Therefore, a plate waste study is a desirable method for further testing the acceptability of an entree to be used in a school lunch program.

Consistency of convenience entrees in terms of quality must be evaluated over a period of time. In cases where the quality of conventionally prepared entrees is not consistent, convenience entrees could be used to improve the overall quality of a school lunch menu.

Cost, the third factor to be considered when evaluating convenience entrees for school lunch, is closely related to quality of the products involved and to the necessity of using convenience products, generated by excessive labor costs. For this reason, a meaningful comparison of the costs of convenience vs conventional entrees can be made only when the factors involved are considered for a specific product to be used in a particular school lunch program. In an existing facility, only food costs and those labor costs which can be eliminated are relevant.(30)

Food costs for conventional products depend upon prevailing prices in the area, the extent to which commodities are available, and to what extent the school is able to make quantity purchases. Also, different conventional recipes for the same entree can vary considerably in cost.

The food cost for convenience entrees is closely related to quality, and therefore will vary depending upon the standards imposed by a particular school district. Another factor relating to food cost is the source from which a convenience product is available. For example, a product purchased from a distributor will be higher in price than the same product obtained directly from the manufacturer. The amount of freezer space in the school lunch facility will determine the frequency of deliveries necessary, and this, too, can affect the cost of the product.

A most important factor in the comparison of costs between convenience and conventional entrees is labor. For this comparison, it is necessary to determine the actual labor requirements involved in the preparation of the specific entrees in the school lunch program in which they are to be used. The labor costs will vary with the amount and kind of equipment available, with the skill level of the cooks who prepare the product, and with prevailing wage rates. An additional factor is the amount of labor required for preparation of a given entree.

If convenience entrees are to be used in a school lunch program, labor must be trained and organized in order to realize the potential savings in labor cost. To substantially reduce the labor costs of a school lunch program, it would probably be necessary to use convenience products on a large scale, and for menu items other than the entree. Savings in purchase cost of equipment and space requirements are not relevant in existing facilities, but would be considered if a new school

lunch facility were to be built to accommodate a total convenience system.

Further research is needed in order to establish criteria by which convenience foods can be evaluated for use in a school lunch program. Evaluation of convenience products used in school lunch programs in different sections of the United States would be helpful both to operators of school lunch programs and to manufacturers of convenience foods and equipment. Another possible area for research is in the establishment of standards for the use of soy as an acceptable source of protein for meeting the nutritional requirements of the Type A lunch.

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APPENDIX A

LISTING OF INGREDIENTS FOR CONVENIENCE AND CONVENTIONAL ENTREES

I. CHICKEN FRIED STEAK

CONVENIENCE	*	CONVENTIONAL (650)	
Meat Pattie		**Meat Pattie**	
Beef		Ground Beef	91#
Water		Water	
Soy Protein Concentrate		Dry Bread Crumbs	8#6oz
NF Dry Milk Solids		Split Peas	8#
Salt		Eggs (39)	4#
Onions		NF Dry Milk Solids	2#8oz
Hydrolyzed Veg. Protein		Salt	19oz
Dextrose		Dry Mustard	6½tsp
Pepper			
Breading		**Breading (for 650)**	
Flour		Flour	2#
Baked Leavened Wheat Crumbs		Bread Crumbs	1#
NF Dry Milk Solids		NF Dry Milk Solids	4oz
Salt		Salt	3oz
Spices		Pepper	2t

II. CORN DOGS

CONVENIENCE	*	CONVENTIONAL (650)	
Frankfurter		**Frankfurters**	
Beef		Beef	
Pork		Pork	
Water		Water	
Beef Navel Ends		Smoked Cured Pork	
NF Dry Milk Solids		NF Dry Milk Solids	
Salt		Dextrose	
Spices and Seasonings		Salt	
Ground Mustard		Corn Syrup	
Onion Powder		Smoke Flavoring	
Black Pepper		Sodium Nitrite	
Sodium Nitrite		Sodium Nitrate	
Sodium Nitrate		Sodium Erythorbate	
Batter		**Batter**	
Water		Water	7½gal
Wheat Flour		Wheat Flour	20#
Yellow Corn Meal		Yellow Corn Meal	20#
NF Dry Milk Solids		NF Dry Milk Solids	7½#
Sugar		Salt	2 cups
Vegetable Oil		Eggs, whole	8
Potato Flour		Baking Powder	2 1/3#
Salt			
Baking Powder			
Powdered Egg Yolks			
		Lard	16#2oz

III. HAMBURGER PATTIES

CONVENIENCE *	CONVENTIONAL (650)	
Beef	Ground Beef	91#
Water	Water	
Reconstituted Minced Onion	Dry Bread Crumbs	8#6oz
Soya Grits	Split Peas	8#
Salt	Eggs (39)	4#
Hydrolyzed Plant Protein	NF Dry Milk Solids	2#8oz
Spices	Salt	19oz
Caramel Coloring	Dry Mustard	6½tsp.
Monosodium Glutamate		

*Quantities of ingredients were not available for all the convenience products. Some manufacturers do provide this information for hospitals or school lunch.

APPENDIX B

RESEARCH DATA

I. CHICKEN FRIED STEAK

	Convenience Product				Conventional Preparation			
	Experimental Session			Average	Experimental Session			Average
	#1	#2	#3		#1	#2	#3	
Cooked weight/serving	3.02	2.94	3.00	2.987oz	2.56oz	2.60	2.63oz	2.597oz
Food cost/serving	$			.1260				.0868
Food cost/650 servings	$			81.9000				56.4767
Labor hours/day's prep.	1.825	1.975	2.150		7.209	6.855	6.230	
Labor cost/day's prep.	3.395	3.673	3.999		13.408	12.750	11.588	
Number of servings prepared	668	672	657		644	680	645	
Labor hours/serving	.00273	.00294	.00327	.00299	.01119	.01008	.00966	.0103
Labor cost/serving	$ .0051	.0055	.0061	.00557	.0208	.0187	.0180	.01917
Labor cost/650 serving	$ 3.315	3.575	3.965	3.618	13.520	12.155	11.700	12.458
Food&Labor cost/serving	$ .1311	.1315	.1321	.13157	.1076	.1055	.1048	.10597
Food&Labor cost/650 serv	$85.215	85.475	85.865	85.520	69.940	68.640	68.120	68.900
TOTAL Number Served	654	648	645		639	643	658	
TOTAL Weight Served	123#7oz	119#1oz	120#1oz		102#4oz	104#8oz	107#8oz	
Weight Returned as Waste	20#2oz	16#10oz	18#8oz		12#10oz	14#	15#13oz	
Weight as % of Weigh Serv	16.30%	13.96%	15.41%	15.17%	12.35%	13.40%	14.71%	13.55%

Leftover steaks were heated during the meal. Average weight of the thirteen leftover steaks was 2.6oz.

II. CORN DOGS*

	Convenience Product				Conventional Preparation			
	Experimental Session			Average	Experimental Session			Average
	#1	#2	#3		#1	#2	#3	
Cooked weight/serving	3.29oz	3.27oz	3.38oz	3.313oz	3.66oz	3.48	3.89	3.677oz
Food cost/serving	$			.1000				.0692
Food cost/650 servings	$			65.0000				44.9926
Labor hours/day's prep.	1.002	.618	.670		8.259	7.390	7.827	
Labor cost/day's prep.	$ 1.864	1.149	1.246		15.360	13.745	14.558	
Number of servings prep.	664	645	650		654	665	660	
Labor hours/serving	.00151	.00096	.00103	.00117	.01263	.01111	.01186	.01177
Labor cost/serving	$ .0028	.0018	.0019	.00217	.0235	.0207	.0221	.02210
Labor cost/650 servings	$ 1.820	1.170	1.246	1.412	15.275	13.455	14.365	14.365
Food&Labor cost/serving	$ .1028	.1018	.1019	.10217	.0927	.0899	.0913	.09130
Food&Labor cost/650 serv	$66.820	66.170	66.246	66.412	60.255	58.435	59.345	59.345
TOTAL Number Served	662	643	636		654	665	641	
TOTAL Weight Served	136#2oz	131#6oz	134#5oz		149#6oz	144#15oz	155#13oz	
Weight Returned as Waste	12#4oz	7#7oz	10#10oz		11#8oz	5#5oz	14#11oz	
Waste As % of Weight Served	9.00%	5.66%	7.91%	7.52%	7.7%	3.67%	9.43%	6.93%

*A "serving" of corn dogs consisted of one convenience corn dog (made with a 1¼oz frank) or two conventional corn dogs (made with one-ounce franks).

III. HAMBURGER PATTIES

	Convenience Product				Conventional Preparation			
	Experimental Session			Average	Experimental Session			Average
	#1	#2	#3		#1	#2	#3	
Cooked weight/serving	2.03oz	1.94oz	1.93*	1.967oz	2.17oz	2.18oz	2.17oz	2.173oz
Food cost/serving $				.0880				.0865
Food cost/650 servings				57.2000				56.2242
Labor Hours/day's prep.	.583	.621	.551		5.675	5.706	5.155	
Labor cost/day's prep. $	1.085	1.156	1.026		10.555	10.613	9.588	
Number of servings prep.	668	667	658		660	677	741	
Labor hours/serving	.00087	.00093	.00084	.00087	.00860	.00843	.00696	.00799
Labor cost/serving $	.0016	.0017	.0016	.00163	.0160	.0157	.0129	.01487
Labor cost/650 servings $	1.040	1.105	1.014	1.053	10.400	10.205	8.385	9.663
Food&Labor Cost/serving $	.0896	.0897	.0896	.08963	.1025	.1022	.0994	.10137
Food&Labor cost/650 serv $	58.240	58.305	58.214	58.253	66.625	66.430	64.610	65.888
TOTAL Number Served	668	666	649		657	649	655	
TOTAL Weight Served	84#13oz	80#9oz	70#9oz		88#15oz	88#7oz	88#13oz	
Weight Returned as Waste	9#14oz	10#12oz	7#6oz		6#3oz	8#1oz	8#12oz	
Waste As % of Weight Served	11.64%	13.34%	10.45%	11.81%	6.96%	9.12%	9.85%	8.64%

*Not enough 2oz patties had been ordered for the days meal, so of the 649 patties served, 320 were 1½oz. Average cooked weight of all patties served was 1.74oz.

APPENDIX C

COST OF STANDARDIZED RECIPES USED FOR CONVENTIONAL ENTREES

I. CHICKEN FRIED STEAK

650 Servings — $0.0868/serving

Ingredient	Amount	Cost Per Unit	Cost
Meat Pattie			
NFD Milk Solids	2.5#	$0.41/#	#1.0250
Dry Mustard	6.5tsp.	0.0082/Tbsp	.0191
Salt	19oz	0.00106/oz	.0201
Dry Bread Crumbs	8#6oz	- - -	- - -
Eggs	39	0.40/doz	1.3000
Split Peas	8#	0.12/#	.9600
Ground Beef	91#	0.581/#	52.7800
		TOTAL	$56.2229
Breading			
Flour	2#	$ 0.07/#	$ 0.14
NFD Milk Solids	4oz	0.41/#	0.1025
Bread Crumbs	1#	- - -	- - -
Salt	3oz	0.00106/oz	0.0032
Pepper	2tsp.	0.041/oz	0.0068
		TOTAL	$ 0.2525

Cost of 650 Chicken Fried Steaks . . . $56.4754

$56.4754 ÷ 650 = $0.0868/serving

II. CORN DOGS

650 Servings (1300) $0.0692/serving

Ingredient	Amount	Cost Per Unit	Cost
Frankfurters			
Franks	81.25#	$ 0.44/#	$ 35.75
		TOTAL	$ 35.75
Batter			
Flour	20#	$0.07/#	1.40
Corn Meal	20#	0.08/#	1.60
Salt	2cups	0.00106/oz	.02261
Baking Powder	2.33#	0.195/#	.4544
Eggs	8	0.40/doz	.2668
NFD Milk Solids	7.5#	0.41/#	3.0750
Water	7.5gal	- - -	- - -
		TOTAL	$6.81881
Lard			
Lard	16#2oz.	$0.15/#	2.41875
		TOTAL	$2.41875

Cost of 1300 Corn Dogs $44.98756

$44.98756 ÷ 650 = $0.0692/serving

III. HAMBURGER PATTIES

650 Servings — $0.0865/serving

Ingredient	Amount	Cost Per Unit	Cost
NFD Milk Solids	2.5#	$ 0.41/#	$ 1.0250
Dry Mustard	6.5tsp.	0.0082/Tbsp.	.0178
Salt	19oz	0.00106/oz	.0201
Dry Bread Crumbs	6oz	- - -	- - -
Eggs	39	0.40/doz	1.3000
Split Peas	8#	0.12/#	.9600
Ground Beef	91#	0.58/#	52.7800
		TOTAL	$56.2229

Cost of 650 Hamburger Patties . . . $56.2229

$56.2229 ÷ 650 = $0.0865/serving

VITA

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Joan Webster Allen

Candidate for the Degree of

Master of Science

Thesis: EVALUATION OF SELECTED CONVENTIONAL AND FROZEN CONVENIENCE ENTREES FOR USE IN A SCHOOL LUNCH PROGRAM

Major Field: Food, Nutrition and Institution Administration

Biographical:

Personal Data: Born in Kearney, Nebraska, April 1, 1937, the daughter of Mr. and Mrs. Dillo Webster.

Education: Graduated from Kearney High School, Kearney, Nebraska, in May, 1955; attended Nebraska State Teachers College during the summers of 1955 and 1956; received the Bachelor of Science degree from University of Nebraska in 1960, with a major in Food and Nutrition.

Professional Experience: Alpha Lambda Delta, Omicron Nu.