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A STUDY OF THE SANITARY CONDITIONS
IN THE SCHOOL LUNCH PROGRAMS
OF SIX RAVALLI COUNTY TOWN SCHOOLS
FOR THE 1950-51 SCHOOL YEAR

by

RUSSELL D. GIESY

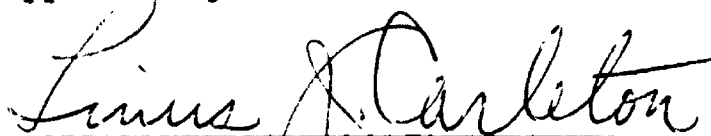
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the requirements for the degree of
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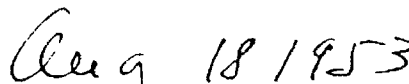
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CHAPTER I

THE PROBLEM AND PURPOSES OF THE STUDY AND THE SCHOOLS STUDIED

I. THE PROBLEM

The Problem and Its Importance. The following incident points out rather dramatically the problem of sanitary conditions in the school lunchroom.

In a certain Montana High School a scarlatina epidemic broke out. The rapidity of spread and magnitude of the number of cases was believed by many to have come about as a result of raw milk served the students. While this was proven not to be the case by the State Department of Public Health, such could easily have been the source of distribution. At any rate, this situation gave rise to further inquiry into the whole matter of the degree of sanitation existing in this, or any other, school lunch program. Further observations revealed some obviously unsanitary practices, as well as evident inadequancies in the physical facilities necessary to carry on an efficient program for the feeding of school children.

Reading on the subject revealed that lunchroom services for school children has grown rapidly in recent years. For example, in 1937, 342,031 children in 3,838 schools of the United States were receiving lunches at school; in 1944

a total of over 8,000,000 children in 60,000 schools participated in the lunch program.¹ Participation in the National School Lunch Program during the 1953 school year reached a total of 9,900,000 children.² This establishes a new record and is 5.8 per cent above participation in the 1951-52 school year, which was the previous high. Such growth has created demands for space and services not available in most of the older and many new school buildings. In many cases lunchrooms have been put in basements or in other poorly adapted areas. Vermin-proof storage with proper temperature controls is not always available. Too often patrons want to be able to point to a beautiful building and all too often the end result is a cheapening of inside surfaces and a failure to provide adequate sanitation.

The school lunch problem is particularly acute in Montana since many of the schools in the state have very small enrollments. The impetus has been so great for warm noon meals that these schools have undertaken the task with limited finances and space. School lunch programs set up under these conditions often lack many desired and necessary

¹Paul H. Leonard, "Past and Present of School Lunches," School Life, XXVIII (March, 1946), p. 11.

²"57,000 Schools in National School Lunch Program," Locomotive Engineers Journal, LXXXVIII (April, 1953), p. 247.

features.

An outline of the Montana School Lunch Program sent out by the State Superintendent of Public Instruction lists seven points to be considered when setting up a school lunch program. Two of these points state:

You should have adequate space and equipment to serve the estimated number of children, and the physical facilities should be such that adequate sanitary precautions can be observed.³

The fact that many schools which are poorly equipped are in very special need of school lunches from the standpoint of nutrition and education does not lessen the need for safe sanitary practices in the lunch program.

Section Two of the National School Lunch Act, passed by Congress and signed by the President in June, 1946, states:

It is hereby declared to be a policy of Congress, as a measure of national security, to safeguard the health and well-being of the nation's children and to encourage the domestic consumption of nutritious agricultural commodities and other food, by assisting the states through grants-in-aid and other means, in providing an adequate supply of foods and other facilities for the establishment, maintenance, operation, and expansion of non-profit school lunch programs.⁴

³"Outline of the Montana School Lunch Program," Distributed by the Office of the State Superintendent of Public Instruction, Helena, Montana.

⁴ Loc. cit.

If the health and well-being of the nation's children is considered a measure of national security, then adequate sanitation of school lunch programs should be a required policy for all schools participating in school feeding.

II. THE PURPOSES OF THE STUDY

The purposes of this study were (1) to set up a plan for checking the sanitary conditions of school lunch programs; (2) to apply the plan to six high schools in Ravalli County in order to gather data and allow comparisons to be made with other lunch programs in the state; (3) to investigate food services and physical equipment as recommended by authorities with a view toward showing what standards should exist; (4) to compare situations found in the Ravalli schools with the ideal situations as recommended by authorities; (5) to make school lunch personnel and administrators more cognizant of sanitary conditions in their school lunch programs and the need for improvement; and (6) to make recommendations and suggest other phases of the lunch programs in need of further investigation.

III. THE SCHOOLS THAT WERE STUDIED

The lunch programs of six town schools in Ravalli County (Florence-Carleton, Stevensville, Victor, Corvallis,

Hamilton, and Darby) for the 1950-51 school year, were studied. These schools were studied because of their convenient location, their variation in size, and the community interest shown in their schools.

Ravalli County, with a population of approximately 13,500 people, is about ninety miles in length and seventeen miles in width. Agriculture and dairying are the two main vocations with a few small lumber industries aiding in employment. Although the land is fertile, the farms are small, limiting the incomes of most people.

The assessed valuation of Ravalli County is low compared to other counties in the state. High mill levies are therefore required to finance their schools; for example, fifty-eight mills were levied for School District No. 1 in 1950. The people's interest in their schools has been proven by their support in voting for special levies whenever it has been necessary.

CHAPTER II

THE DESIRED SANITARY CONDITIONS AND QUALITIES FOR A SCHOOL LUNCH PROGRAM

I. TYPES OF SCHOOLS

The ideal type of school for a school lunch program is one with an enrollment and financial status sufficient to make it possible to provide everything necessary to carry on a program such that nutritious and economical meals will be served in a sanitary fashion. The fact that 36 per cent of the nation's schools in cities with a population of 2,500 and above have lunch programs as compared to 22 per cent for the nation's rural schools seems to present evidence that city schools in general are more able to carry on lunch programs and have better facilities for such.⁵

II. THE PROGRAM

An ideal lunch program would be one which could provide a great variety of foods, so as to make the meals inviting and to insure that each pupil would secure a well balanced, nutritional meal at a minimum of cost. The ideal program would have adequate space and equipment to serve the

⁵Paul H. Leonard, "Past and Present of School Lunches," School Life, XXVIII (March, 1946), p. 14.

pupils and would contain physical facilities such that adequate sanitary precautions could be observed.

III. THE FACILITIES

The object of the school feeding movement is to provide facilities that will make it possible for pupils to secure an adequate, wholesome noon meal despite the fact that they are attending school.

The Lunchroom. The size of the lunchroom should be determined by the number of people to be served. It is generally accepted that the lunchroom should have a floor area of ten to twelve square feet per person served at the largest shift.⁶

Most authorities state that lunchroom floors should have smooth surfaces and be non-odor-absorbing, impervious and non-slip. Unless other uses of the area dictate to the contrary, asphalt tile or linoleum are the most practical coverings.⁷ They are impervious to dirt, easily maintained, wear well, are sound-absorbent, and have numerous possibilities for decorative purposes. If wood flooring and wood

⁶Cleve O. Westby, "Physical Facilities For a School Lunchroom," School Executive, LXVIII (July, 1949), p. 53.

⁷Ibid. p. 54.

trim are used, they should be well seasoned and expansion joints should be protected from dirt.⁸

The noise incidental to handling dishes and the resultant tendency for the occupants of the lunchroom to raise their voices make acoustical treatment imperative. Usually a ceiling covered with perforated tile will be sufficient, though occasionally treatment of the walls also will be necessary. Perforated tile has the advantages over other types in that it may be painted as many as twelve times without seriously affecting its sound absorption qualities.⁹ Perforated tile also possesses good washing qualities.

The walls in the lunchroom may be plastered or finished to harmonize with walls in the classrooms; however, as mentioned above, perforated tile is preferable when funds permit. If walls are plastered, they should be smooth to facilitate cleaning.

In general, dark surfaces that help cover dirt are being used less and less in school buildings. Ample illumination and light surfaces are important factors in school sanitation. The walls and ceiling of the lunchroom must be washable so that condensations of smoke and food vapors

⁸Nelson E. Viles, "Sanitation in Many School Buildings Deplorable," School Life, XXXII (May, 1950), p. 113.

⁹Westby, loc. cit.

may be removed. High gloss enamels are often used, but are objected to because of the glare. This can be reduced by spraying the enamel on so as to produce an "orange peel" effect which cuts down on glare. "The use of soft pastel colors tends to reduce glare somewhat."¹⁰ Harsh, brilliant, white enamels have no more place in the school lunchroom and kitchen than they have in our most modern hospitals which are turning to soft, comfortable colors even in the operating rooms.

If the lunchroom is used only for cafeteria purposes, fifteen to twenty foot-candles of light are sufficient at the table level.¹¹ If indirect or semi-indirect fixtures are used, the ceiling should not be finished with a high gloss enamel because of the resultant glare. The present trend is to use ultraviolet light to reduce materially bacterial content in the air of the lunchroom.

Since air is a medium for carrying dust, germs, and odors, good ventilation constitutes a sound sanitary measure. As high as 40 to 60 per cent of the organisms can be removed from the air by means of glass or steel wool filters treated with viscous oil, or by using commercial air washers containing

¹⁰Westby, loc. cit.

¹¹Loc. cit.

sterile water.¹² In a normal lunch program, eight to twenty-one cubic feet of fresh air per minute per person will take care of body and food odors.¹³ Under no condition should air be gathered into main ducts from all the rooms and recirculated through the building. Windows alone are not considered adequate for ventilation purposes, because in the winter windows are usually kept closed to conserve heat. If windows are used for ventilation in the spring, they should be screened; however, this still does not keep dust and germs from entering.

Heating of lunchrooms is usually of the same type found in the school plant. The trend in heating of schools, including classrooms and lunchrooms, is toward radiant baseboard or panel heating.¹⁴

Waxed hardwood and linoleum are considered by many authorities best for table tops. Other materials which are stainproof and washable are acceptable; however, they lack the qualities of these two types.

The Kitchen. The size of the kitchen should be determined by the number of people to be served. Kitchen

¹²Paul W. Seagers, "A Different Approach to Ventilation," Nations Schools, XLII (October, 1948) p. 60.

¹³Loc. cit.

¹⁴"Radiant Baseboard Heating," Architectural Forum 92, (May, 1950), p. 150.

space should be from 1.5 square feet to 2.5 square feet per person served.¹⁵ Cleve O. Westby, Director of School Building Facilities in the Department of Instruction in Olympia, Washington, has prepared table I to help determine the size of the kitchen.¹⁶

The peak of school enrollment is due in 1954 in the elementary, 1958 in the junior high, and 1962 in the senior high. Anyone planning a school lunch program would be wise to consider the figures in table I regarding kitchen size.

The preferred material for kitchen floors is quarry tile, with a cove and base of the same material.¹⁷ It is acoustically poor and is sometimes fatiguing to stand upon while working, but none of the more resilient floor coverings can equal it for durability, ease and economy of maintenance, imperviousness to soil, and nonslip qualities. If concrete is used, it should have a smooth finish and be painted with a soilproof or wax paint which possesses nonslip properties.

When funds permit, it is again recommended by authorities that the ceiling be covered with perforated

¹⁵Gertrude N. Bowie, "Lunchrooms," School Executive, LXVIII (January, 1949), p. 43.

¹⁶Westby, op. cit. p. 53.

¹⁷Loc. cit.

TABLE I

RECOMMENDED FLOOR AREA OF KITCHEN PER NUMBER OF MEALS SERVED

No. of meals served	Minimum kitchen size
100 or less	200 sq. ft.
100 -- 200	300 sq. ft.
200 -- 300	300 plus $1\frac{1}{2}$ sq. ft. per meal in excess of 200
300 -- 400	450 plus 1 sq. ft. per meal in excess of 300
500 or more	650 plus $\frac{1}{2}$ sq. ft. per meal in excess of 500

Taken from School Executive, LXVIII (July, 1949), p. 53.

tile because of its acoustical qualities. Noise due to handling of dishes, pots, and pans, is greatly reduced by this type of ceiling. For economy, smooth plaster finished with a washable enamel may be used. Plaster possesses non-odor absorbing qualities and may be painted numerous times, though it is more difficult to maintain.

Glazed tile or brick is preferred for the kitchen walls.¹⁸ Where funds do not permit this, there should be a wainscot about six feet high or glazed tile or brick. The upper part of the wall may be smooth plaster painted with a washable enamel. Other types of wainscots such as wood paneling, linoleum, or plaster will be found less durable and more difficult to maintain.

Because of condensation of smoke and food vapors on the walls, ceilings, and woodwork, these surfaces must be washable. High gloss enamels are often used, but are often objected to because of the glare. This can be reduced by spraying the enamel on so as to produce an "orange peel" effect which cuts down the glare.

Too many school lunch employees work in gloom or glare. Working either in shadow or direct sunlight causes tension that adds up to greater fatigue by the end of the day. Poor lighting can be the cause of accidents: cuts,

¹⁸Loc. cit.

falls, burns, and spilled food. The difficulties are more acute because some women working in the school kitchen are in the older age groups and are more likely to have defective vision.

Industrial studies by the United States Public Health Service, covering nearly 1,000,000 people, have shown that 48 per cent of workers between thirty and forty years of age and 71 per cent between forty and fifty have defective vision.¹⁹

Engineers say that if light is well distributed, twenty-foot candles will do for general room lighting; thirty-foot candles are needed for reading scales, mixing of ingredients, and inspection.²⁰ One should plan to make as full use of natural light as efficient layout of space and equipment permit.

The type of electric lighting selected should be that which will give the recommended foot candles of light at work centers. Fixtures should be placed in relation to work areas and should supply light from several sources so as to avoid making shadows or glare fall on the workers eyes. Well placed, properly shaded incandescent bulbs are satisfactory for lighting in the school kitchen. "White" fluorescent tubes are preferred by some. They radiate less

¹⁹Margaret Dreisbach, "Good Light for the School Lunch," Practical Home Economics, (March 1952) p. 127.

²⁰loc. cit.

heat and use less electricity than the incandescent bulb, though the cost of installing fluorescent lighting is greater. Disinfectant lighting fixtures, in addition to normal lighting, are popular among sanitarians. With good lighting it is easier to keep dishes, utensils, refrigerators, and other equipment, store-room shelves, and floors clean and sanitary.

One of the short-comings of many school lunch programs is the inadequate ventilation of the kitchen. Fume hoods and exhaust fans are necessary equipment in programs of any considerable size. In addition to the hoods over steam kettles, stoves, and ovens, additional exhaust fans and ducts will be necessary in the dishwashing area as well as other areas not cared for by the hoods.

Work tables should be substantial in construction with smoothly finished non-absorbent tops. Linoleum, stain-resistant metal, and hardwood with waterproof finish make good working surfaces.²¹ The counters and tables should be so constructed as to be easily cleaned.

Schools which carry on a lunch program without hot running water should be provided with a stove of such capacity as will furnish abundant heat for heating large amounts

²¹Irene Burba, "Essential Equipment for the School Kitchen," Nations Schools, XLIV (September, 1949) p. 64.

of water. "The heavy duty, uniform-heat-top range is preferable to the open burner type."²² A solid-heat-top range provides for easier and more efficient cleaning after use because of the solid top. For safety and sanitary reasons the electric range is favored over the gas type stove.

Cold storage of perishable foods should be in the kitchen or be easily accessible from the kitchen. Perishable foods should be stored at temperatures of fifty degrees Fahrenheit or less, except when being prepared or served. It is satisfactory to maintain refrigeration temperatures of forty to fifty degrees Fahrenheit.²³ The walk-in type of refrigeration unit will serve best for schools with large school lunch programs. All interior surfaces of such units must be washable and the floor should have a drain to permit easy defrosting. In some communities an auxiliary deep freeze unit has been found to be a good investment. Smaller schools will find it cheaper to buy and operate a standard refrigerator of suitable capacity.

In a school kitchen serving no more than 500 complete hot lunches, it is not necessary to provide a separate dishwashing room. In most cases the dishwashing areas, as part

²²loc. cit.

²³Marian L. Cronan, "Look at School Lunch Sanitation," Practical Home Economics, XXV (October 1947), p. 532.

of the kitchen are more sanitary, more efficient, and more pleasant than a separate dishwashing room.²⁴

Mechanical dishwashers are becoming a "must" in school cafeterias because public health regulations are very specific about dishwashing. In any dishwashing area with a dishwashing machine there should be a pre-rinse sink approximately twenty-four inches by twenty-four inches installed in the soiled dish table at least twenty-four inches from the dishwashing machine.²⁵ Where a mechanical dishwasher is not possible, there should be a three-compartment sink with adequate work surfaces for scraping, stacking, and draining dishes, plus hot water storage tanks. The pre-rinse sink should be equipped with a removable perforated tray for the purpose of ready disposal of waste rinsed from the dishes. It is recommended that this sink be supplied with water running through a flexible hose with shower head spray attachment.²⁶

Auxiliary heaters for water are an essential piece of equipment in a lunch program of today. Not only do they maintain proper water temperatures and serve in cases of

²⁴"Planning the Lunchroom Kitchen," Nations Schools, XLIV (October, 1949), p. 44.

²⁵loc. cit.

²⁶loc. cit.

emergencies, but they insure hot water in the spring and fall when steam is off in the main boiler. The size of the auxiliary heater is dependent upon the number of pupils to be fed. The electric hot water heater has its disadvantages in case of power failure, though for conservation of space and safety it is preferred to the gas type auxiliary heater.

Storage of utensils and dishes in clean, tight cupboards is a sanitary practice that should be carried on by all schools. Solid wood or glass doors are immaterial as long as the doors are tight.

No particular type of dish has been agreed upon by authorities as ideal for a lunch program. Several types are considered acceptable. The points to look for in selecting dishes are their chipping, breaking, and stacking qualities, and whether or not they stain easily and wash well.²⁷ Stainless steel and aluminum division trays were popular at first, although heavy china and white plastic division plates seem to be the preferred type today. The stacking qualities of heavy chinaware is poor and the cost high, but they wash easily and do not stain. Plastic dishes have good stacking qualities, are cheaper, and do not stain, but do not wash as easily as china.

²⁷Harry E. Stewart, "Our Experience with Plastic Dishes in Institutional Feeding," Nations Schools, XLIII (April 1949) p. 65.

The Storeroom. Storage space requirements will vary with buying habits, but, in general, one-half square foot per meal served per day will provide a good guide.²⁸ It is also recommended that not less than fifty square feet be allotted to the storeroom for any lunchroom kitchen serving 150 or more complete hot lunches.²⁹

The dry storage room must be vermin and insect-proof. The floor should be concrete and provided with a drain for easy cleaning. Walls, racks, or shelves must be washable. All commodities should be placed on shelves well above the floor so that the floor is always clear for cleaning, thus eliminating hiding and breeding places for insects. The room should be dry and well ventilated, its temperature between forty-five and fifty degrees Fahrenheit.³⁰ The entrance to the storeroom should be so located as to be within the view of the supervisor at all times to prevent pilferage.

The Lavatories and Dressing Rooms. For sanitary reasons and convenience of personnel, there should be suitable toilet, washroom, and dressing room facilities. Lockers

²⁸Westby, op. cit., p. 54.

²⁹"Planning the Lunchroom Kitchen," Nations Schools, XLIV (October 1949), p. 45.

³⁰loc. cit.

for clothing and personal effects should be provided. These should be located at the employees' entrance to the kitchen and preferably should not open into the kitchen proper. The size of such rooms depends upon the number of persons employed in the lunch program. If both sexes are employed, there should be separate rooms for each and they should be labeled as to sex allowed to use each. These rooms should be provided with self-closing doors. They should have approved hand washing facilities conveniently accessible, clean toilet rooms, fixtures in good repair, and floors of a nonabsorbent material, or covered with such material as can be made watertight with suitable waterproofing material. Quarry tile is one of the best lavatory and dressing room floors. Soap and single service or approved individual towel service should be provided. All lavatories should be equipped with hot and cold running water. Hand washing signs for employees should be placed in the lavatories. Too much emphasis cannot be placed on lavatories for students as well as employees, because a study of sanitary facilities made in 1949 by the Cleanliness Bureau reported less than one-half of the schools in America as having acceptable sanitary and washing facilities.³¹

³¹Nelson E. Viles, "Sanitation in Many School Buildings Deplorable," School Life, XXXII (May, 1950) p. 113.

IV. FOOD PREPARATION, FOOD SERVICES, AND FOOD DISPOSAL

Food Preparation. School lunchroom workers, guardians of the health of our American children, have not only a job but a responsibility. The enemies of health in a food handling establishment are mainly bacteria. The food sanitarian is concerned chiefly with the bacteria associated with the respiratory diseases.³² These can be transmitted either by contaminated food, or by unclean dishes and utensils. Contamination of food can be prevented by personal hygiene, good food-handling practices of food workers, and by protection of food during preparation. Food low in price is permissible, but it should not be fermented, decomposed, frostbitten, unclean, or of unsanitary quality. Home-canned fruits are safe, but home-canned meats and vegetables should be used only after being boiled fifteen minutes after being removed from the can.³³

In the absence of satisfactory refrigeration, "leftovers" should never be carried over to the next day. Food prepared must be eaten, sent home with the children, or put

³²Raymond Wagner, "Look at School Lunch Sanitation," Practical Home Economics, XXV (October 1947), p. 529.

³³Joint Committee on Health Problems in Education, The National Elementary Principal, XXVII (December, 1947) p. 22.

in the garbage the same day it is prepared.

Food poisoning cases are seldom reported unless a number of persons are made ill or die at one time. Assuming that 5 per cent of food poisoning cases are reported, "authorities say at least 200,000 to 250,000 per year are made ill because of the ignorance or carelessness of food handlers."³⁴

An approved source of water supply is essential and necessary in any community. Sanitary qualities of water can be uncertain from day to day, so daily tests of the water are ideal. Where this is not feasible, tests should be made as often as possible. The communities of Montana are ordinarily able to obtain within a week the results of water samples sent to the Public Health Service. Ideally, all schools should take advantage of this service for the protection of the pupils.

Such diseases as typhoid, tuberculosis, scarlet fever, diphtheria, septic throat, and intestinal diseases of children probably have milk as their chief source of infection.³⁵ The properties which make milk a valuable food for human beings make it also an ideal food for bacteria. For these reasons milk should be pasteurized or

³⁴Lawrence McCracken, "How You Can Judge A Restaurant," Hygeia, XXVII (October 1949), p. 680.

³⁵Francis D. Curtis, Otis W. Caldwell, Nina H. Sherman, Everyday Biology (Boston: Ginn and Company, 1943), p. 375.

evaporated and kept under refrigeration as much of the time as possible. If unpastuerized, it should be boiled on the premises. If powdered milk is used, it must be mixed with safe water within an hour or two of the time it is to be used.³⁶ Milk should be obtained from approved sources and served in original individual bottles or from some approved milk dispenser. The milk grade should be posted on all bottled milk, and sanitary straws, purchased in sanitary cartons, should be used in drinking milk from the bottles.

All meat used in lunch programs should be inspected and stamped with an official stamp. Ground fresh meats and variety meats should be used within forty-eight hours after purchase, because they are excellent mediums for bacterial growth. Shellfish should be obtained from approved sources and kept in containers in which they were placed at the shucking plant.

Workers should exercise care in handling food, utensils, and containers. Contamination of food can best be prevented by personal hygiene and food handling practices; by protection of food during preparation, display, and

³⁶Joint Committee on Health Problems in Education, The National Elementary Principal, XXVII (December, 1947), p. 32.

³⁷"Rating and Inspection of Lunchrooms," School Executive, LXVIII (March, 1949), p. 72.

storage; by protection from dust, droplet infection, flies, roaches, and rodents; by cleanliness of equipment and utensils in contact with food. Frequent washing of hands by employees is considered an excellent sanitary practice. Washing of hands after use of toilet is a "must."

There is no question but that food should be kept in dustproof and verminproof containers to insure proper sanitation. Food and drink should be stored, displayed, or served so as to be protected from dust, rodents, flies, and other insects, overhead leakage, or other contamination. Information as to the best types of containers and display cases varied so greatly that the judgment of such should be left up to the individual or personnel in charge of the lunch program.

Services. The manner in which food is served depends upon many factors. The size of the lunch program, facilities, number of employees, available space--all must be considered in selecting what style to use. Cafeteria, plate, or family style--all have their advantages and disadvantages. The larger schools tend to favor the cafeteria style of serving food. This affords the student a greater variety of food and also insures the quantity of food desired. It also tends to make the meal more satisfactory to the student in that he chooses the food he wishes to eat. Generally, it results in less waste of food. Cafeteria style has its

disadvantages in the cost of equipment such as: steam tables, serving tables, counters, display shelves, and extra dishes and utensils. Another disadvantage of cafeteria style serving, on the nutritional side, is the fact that most students do not know the types of food required for a well balanced meal. Too often students skimp on the noon meal to buy candy bars, or something else, with the money saved on cafeteria meals.

The plate style of serving hot lunches seems to find favor with schools serving less than 500 meals. It has its advantages in that it takes less personnel to operate it, requires less equipment, and insures the student a well-planned meal. The disadvantages of the plate style serving are: (1) the amount of the food wasted is greater, due to dislikes of various foods; (2) the time spent in serving is greater; (3) many students are reluctant to go back for second helpings.

Family style meals are favored by the small country schools where the number of pupils makes it possible to carry on such a program. Family style serving has such advantages as: (1) requires few personnel to operate it; (2) provides a better atmosphere for eating; (3) requires less expensive equipment; (4) can be better supervised. Its disadvantages are more waste of food, and fewer varieties of food offered the students.

Disposal. Preferably the garbage storage should be on the loading platform or adjacent to it. This space, as well as the garbage containers, should be vermin and insect-proof. The floor and walls may be of concrete so that they may be easily washed. Provisions should be made for washing cans, preferably every day, and disinfecting them at least once a week. Where collections cannot be made every day, it may be necessary to refrigerate the garbage to prevent bacterial growth. All garbage cans should be kept covered, and garbage should be wrapped if local ordinances so provide.

V. PERSONNEL

The Joint Committee on Health Problems in Education has made the following recommendation concerning lunchroom personnel and equipment:

The personnel and equipment must be under the daily supervision of some responsible person trained for such work--school physician, or school nurse, principal or home economics teacher, or representative of the health department--who will have authority to order the abatement of a condition which may be dangerous.³⁸

All persons employed in the lunchroom must be scrupulously clean in person and attire. They should be required to submit to such health examinations as the health or school authorities may see fit to require. Preferably the school

³⁸Joint Committee on Health Problems in Education, loc. cit.

doctor or physician should examine all employees at least once each year. Included in this examination should be X-Rays and typhoid tests.³⁹ Employees should have clean hands with fingernails well trimmed and clean. Hands should be washed immediately before handling food and after use of the toilet. Hair should be covered by an appropriate hair net or cap. Workers must exercise the sanitary practice of covering the nose and mouth when coughing or sneezing, and washing their hands after using a handkerchief. Smoking by employees during food preparation and serving is considered an unsanitary practice. Persons with skin diseases or discharging wounds should be required to cease work until such infections are healed. If there is suspicion that the worker is suffering from some communicable disease, he should be examined by a physician or health officer and, if found to have some transmittable disease, he should not be allowed to return to work until permitted by a physician. If there is any infectious disease, such as scarlet fever, in the home of the worker, he should not be permitted to work until given a clean bill of health by a physician.

³⁹ Marian L. Cronon, "Look at School Lunch Sanitation," Practical Home Economics, XXV (October, 1947), p. 532.

VI. CLEANING

The appearance of the lunchroom and kitchen is the immediate and personal responsibility of the lunchroom manager. The ultimate goal is a shining and immaculate lunchroom and kitchen, which is achieved only through consistent, unceasing attention to many small details of good housekeeping.

There should be a general inspection of the lunchroom twice every day; the first, ten minutes before service is scheduled to begin; the second, ten minutes before the women are scheduled to leave for the day.

All equipment, including counters, shelves, display cases, tables, stoves, hoods, and sinks, must be cleaned each day. Cloths used by employees must be clean and used for no other purpose than that for which they were intended. Eating and drinking utensils should be pre-rinsed in a sink with a removable perforated tray for the purpose of ready disposal of waste rinsed from the dishes. Temperature of pre-rinse and washing water should be from 120 to 140 degrees Fahrenheit. A suitable and adequate amount of detergent should be used. Final rinsing of dishes should be with a continuous supply of water 170 to 180 degrees Fahrenheit.⁴⁰ The final rinse with water of this temperature permits air-drying of dishes, lessens work, and provides

⁴⁰"Planning the Lunchroom Kitchen," Nations Schools, XLIV (October 1949), p. 44.

a greater degree of sanitation. Other safe guards against bacteria are the chlorine bath, steam cabinet, or hot-air cabinet. If, however, rinse water of the above mentioned temperature is used, the use of bacterial-killing agents is not necessary. If dishes and utensils are towel dried, the drying cloths must be kept clean and used for no other purposes. Drying cloths should be treated with a disinfectant when washed.

Washing water should be kept reasonably clean by making frequent changes. All cleaning agents used should be nonpoisonous.

Kitchen and lunchroom floors should be swept with a sweeping compound and preferably wet mopped with a disinfectant each day after the meal.⁴¹ If not wet mopped, an oil mop should be run over the floors. All mops and wet brooms should be inverted and aired away from walls and corners in a separate closet or room.

⁴¹Winning S. Pendergast, "General Instructions on Sanitation in School Lunchrooms," What's News in Home Economics, (September 1951) P. 54.

CHAPTER III

THE SANITARY CONDITIONS FOUND IN LUNCHROOMS IN SCHOOLS OF RAVALLI COUNTY

Information was collected on the six high schools in Ravalli County by making personal visitations of their lunch programs. A check list (shown in the appendix, pp. 76-81) was used to insure coverage of all details and to record the findings. In order to get permission to make this survey, no school was to be named. For this reason, a letter was assigned to each school (i.e., A, B, C, etcetera). The method of assigning letters was based on the facts found. The letter "A" was assigned to the school which had the best lunch program of the six schools; the letter "B" was assigned to the school with the next best lunch program, and etcetera. Since this survey was made in the spring of 1951, conditions in one school have changed remarkably because of a new building which provides better facilities.

I. GENERAL INFORMATION

The material presented under this heading and in table II, p. 31, points out facts which must be considered in planning a school lunch program, and allows schools of similar size to compare their programs with those in Ravalli County.

TABLE II

GENERAL INFORMATION ON THE SCHOOL
LUNCH PROGRAMS IN RAVALLI COUNTY
1950-1951

School	Average number of pupils served per day	Cost of meals to pupils	Per cent of U. S. D. A. commodities used	Type meal served
A	309*	17 $\frac{1}{2}$ ¢	15**	A***
B	260	17 $\frac{1}{2}$ ¢	17	A
C	290	20 ¢	5	A
D	106	20 ¢	5	A
E	260	20 ¢	17	A
F	130	17 $\frac{1}{2}$ ¢	7	A

* The figures in this column include elementary and high school pupils, also underprivileged students, who do not have to pay.

**The United States Department of Agriculture makes available, free of cost, to the school lunch programs, those surplus foods which the government purchases under its price support program. Schools have only to pay transportation from Helena to their school, and in addition a small handling or reshipping charge.

***The Type A lunch consists of the following foods:

1. One-half pint of whole milk as a beverage.
2. Two ounces of lean meat, poultry, fish, or cheese, or one egg, or one-half cup of dry beans or peas, or four tablespoons of peanutbutter.
3. Three-fourths cup of vegetables or fruit.
4. Bread made from enriched flour, and butter or fortified margarine.

Type B lunch provides about two-thirds of the food that a Type A lunch does, and should be served to supplement food brought from home. Type C lunch is merely one-half pint of milk served as a beverage.

In every school the lunchroom was used for purposes other than school lunches. The following are some of the uses made of the lunchrooms:

School A -- visual education, play and party room.

School B -- PTA, glee club and school parties.

School C -- PTA.

School D -- PTA, home economics, and other functions.

School E -- physical education classes.

School F -- PTA, (Gymnasium served as the lunchroom).

II. PHYSICAL FACILITIES

The Lunchrooms. The paint of all lunchrooms was of a light color with the exception of school E in which the gymnasium served as a lunchroom. Four of the six schools had their lunchroom ceilings painted white; one, a light cream color. The lunchroom walls of Schools A, C, and E were of soft pastel colors, while those of Schools B and D were white. The walls and ceilings were clean in all schools except School F, which, as mentioned before, used the gymnasium for the lunchroom. Only in Schools A and B were the walls and ceilings washable.

Lunchroom ventilation in Schools A, B, C, and D was adequate for the removal of food odors; however, even they would fall short of accepted standards in supplying the recommended amount of fresh air per pupil. Schools E,

and F were not adequately ventilated since they had no ventilation system other than windows and doors. Schools A and C had one fan, while School B had a cold air return with two "so called" air conditioning units. School D relied on a cold air return for its ventilation. Because of the cool climate in Montana, many are prone to look at ventilation as a relatively unimportant factor in a school lunch program. This mistaken belief has rendered conditions which can be greatly improved in many of our schools.

Screening of lunchroom windows seemed to be one important factor the schools of Ravalli County overlooked, for not one of the schools had screened lunchroom windows. School A plans to screen its lunchroom and kitchen windows in the future and School D, supposedly, never opens its windows. The other schools were little concerned about screening.

Lighting, artificial and natural, in the six schools varied from good to poor. Natural lighting in Schools A, B, and D was good. Schools A and B had less window area than two other schools. The location of the windows and the fact that the lunchrooms were ground level accounted for their being better lighted. The bottom of the windows of Schools A and B were table top level and had small partitions separating each window. School D had the greatest window area, but the frosted glass windows and the fact that

the lunchroom was in the basement, greatly reduced the effectiveness of natural lighting even though the windows were at ground level. School C had the second largest window area, but it had the same disadvantages as School D, plus location of windows on the north side. School E's lunchroom lighting was very poor. It possessed all the disadvantages of School D and C plus a very small window area. School F's lunchroom was even darker than School E's, due to the fact that it was in the gymnasium and that the lights were off.

Table III on the following page shows the number, size, and location of windows and a comparison of window area to floor area in these schools.

Artificial lighting was adequate in four of the six schools. School A had fluorescent lighting; School B had indirect lighting fixtures; and Schools C and D had unshaded incandescent bulbs, which provided adequate light but produced glare. These four schools had sufficient light at table level during the noon meal, though light would probably have been inadequate on a cloudy, dark day. The lighting in School E was poor. Only two unshaded incandescent light bulbs (sixty watts each) furnished light for the lunchroom. School F didn't even turn the lights on in the gymnasium for the pupils to see to eat and as a result was greatly inferior in lighting.

Lunchroom floors were found to be in good condition

TABLE III

THE NUMBER, SIZE, AND LOCATION OF LUNCHROOM WINDOWS WITH A
COMPARISON OF TOTAL WINDOW AREA TO FLOOR AREA

School	Number of windows	Size of windows	Location of windows	Window area	Floor area
A	6	36"x54"	South side	81 sq.ft.	1,810 sq.ft.
B	7	36"x48"	East side	84 sq.ft.	1,431 sq.ft.
C	10	36"x48"	2 West side 8 North side	120sq.ft.	1,000 sq.ft.
D	5	36"x60"	1 East side 4 South side	75 sq.ft.	450 sq.ft.
E	7	36"x24"	4 North side 3 East side	42 sq.ft.	1,200 sq.ft.
F	4	Unable to measure gymnasium windows			

and of accepted material. The floor of School A was smooth concrete painted with a new type wax paint that impregnated the concrete to a depth of four inches. The lunchroom floor of School B was inlaid linoleum. Schools C and D had concrete floors painted with gray waterproof deck paint. School E had unpainted concrete, and School F's gymnasium had a hardwood floor.

The table tops of School A were of varnished hardwood. School B's table tops were of untreated temper masonite and as a result were food-stained and discolored due to washing. The tops also had begun to show wear and were a little rough. School C had varnished masonite table tops which were in good condition. The table tops of Schools D and E were of linoleum and in good condition. The varnished hardwood bleacher seats in the gymnasium of School F served as table tops.

Steam heat was the prevalent type of heating found in the lunchrooms. All schools had steam boilers, but the lunchroom of School D was heated by the hot air given off in the boiler room. Schools A, B, and F had fans for circulation of air from radiators.

The Kitchens. All the schools visited had light color paint in their kitchens. Four schools used the color white and the other two used a light cream color.

The walls and ceilings of the kitchens were clean in four schools. School C, which used white paint, had dirty ceiling and walls. The smoke fumes and food vapors had quite noticeably discolored the ceiling. The walls were not as bad as the ceiling, but appeared to be dirty due to poor housekeeping over a period of time. The ceiling and walls of School F's kitchen also showed signs of improper care. The ceiling was discolored from food vapors and the walls were covered with finger marks and splash stains.

The ceilings and walls of Schools, A, B, C, and E were washable. The ceiling in School D was not washable, but the walls were washable up to four feet. Neither the ceiling nor walls of School F was washable.

Neglect of proper ventilation of the kitchen was in evidence in four of the six schools visited. Food vapors and smoke had no way of escape other than through windows in Schools C, D, and F. School D was little better than the above three, having only a cold air return. The other two schools had ventilation systems other than windows. School A had one exhaust fan. School B had two exhaust fans and a form of air conditioning.

Screened kitchen windows again seemed to be a forgotten item in the lunchrooms. Only in School B were the windows properly screened. School A planned to screen their windows in the future. School D reported that their windows were never opened.

Table IV on the following page shows the number, size, and location of kitchen windows in these schools.

The natural lighting of Schools A, B, and D was adequate on a sunshiny day. On a dull or dark day, however, it is very doubtful that natural lighting alone would be sufficient to meet the desired standards. Schools C, E, and F did not have sufficient natural light even on a clear, bright day. School C had frosted windows which greatly reduced the amount of light. Schools E, and F just did not have window space to provide adequate light.

The kitchens in Schools A, B, D, and F were artificially well lighted, but placement of lights, so as to prevent workers from working in their own shadows, could have been improved. School A had, in addition to its lighting system, two disinfectant lighting devices which were kept on day and night. The kitchens of Schools D and F were so small that they could meet the necessary standards with one light. Artificial lighting in School E was slightly below the desired standards. The lighting in the kitchen of School C was inferior to all others. The ceiling was high and soiled, and the lights were hung on long cords. Two sixty and one one-hundred watt, unshaded, incandescent bulbs were the source of lighting. The kitchen was more or less broken up into rooms by the high cupboards. In all schools more attention could have been given to placement

TABLE IV

THE NUMBER, SIZE, AND LOCATION OF KITCHEN WINDOWS WITH A
COMPARISON OF TOTAL WINDOW AREA TO FLOOR AREA

School	Number of Windows	Size of windows	Location of windows	Window area	Floor area
A	4	32" x 54"	2 South side 2 East side	38 sq. ft.	612 sq.ft.
B	3	24" x 48"	East side	24 sq. ft.	220 sq.ft.
C	2	36" x 48"	South side	24 sq. ft.	400 sq.ft.
D	2	36" x 56"	1 South side 1 West side	28 sq. ft.	72 sq.ft.
E	2	36" x 24"	East side	12 sq. ft.	225 sq.ft.
F	1	24" x 30"	South side	5 sq. ft.	48 sq.ft.

of lights so as to prevent workers from shadowing their work.

The composition of the kitchen floors in four schools was concrete. School A had concrete impregnated with a wax paint; School D had painted concrete; School C and F had unpainted concrete floors. The kitchen floors of Schools B and E were inlaid linoleum.

Linoleum dominated as the covering of work tables in the schools visited. Schools A and B had inlaid linoleum table tops; School E had linoleum and untreated masonite; School D had linoleum; School C had varnished masonite; and School F had softwood table tops.

No particular type of cook stove was common in the schools covered in this survey. Schools A and C had two stoves, one electric and the other gas. Schools B and E each had one gas stove; Schools D and F each had one electric stove. The gas stoves all used propane as a fuel. Schools A and C, which had both types, could carry on their lunch programs in case of power failure.

Fume hoods for stoves were found only in Schools A and E. School B was fixed for a fume hood; however, the installation had not been made. Schools C, D, and F had not made provisions for fume hoods.

In these modern times refrigeration is a process considered as essential for preservation and sanitary

storage of foods, yet two schools (E and F) had no refrigeration of any type. School A contained a fifteen cubic foot refrigerator plus a fourteen by eight by eight foot walk-in freezer. School B possessed a ten cubic foot refrigerator and a ten by six by eight foot walk-in freezer which had not been completely installed. School C had a fifteen cubic foot refrigerator. School D had two refrigerators, eight and twelve cubic feet, plus a sixteen cubic foot deep-freezer.

All schools had enclosed cupboards for dishes and utensils.

Mechanical dishwashers have yet to make their appearance in any of the six high schools in Ravalli County.

Facilities for proper regulation of water temperatures in the main boilers were lacking in all schools, however, it would have been a somewhat unusual instance if the water temperature was too low, since the fires were usually kept burning day and night from the opening day of school to the closing day. The majority of these schools rely on their auxiliary heaters to maintain the desired water temperature. Schools B, C, and E had electric water heaters in addition to the main boiler water system. School D had an auxiliary coal heater to supplement the main boiler system. Schools A and F had no auxiliary water heaters; however, provisions

have been made in School A for an electric heater, and installation is planned in the near future.

No cracked or chipped cooking dishes were found in use in these schools during the visitations and no lead or cadmium utensils were used. The utensils were found to be clean to sight and touch in all schools.

The Storerooms. Because many of the buildings are old and lunchrooms were not in the original plans, storage space for the lunch programs now in effect had to occupy any available space not in use. Only Schools A and B had planned storage rooms. The other four schools used cubbyholes under stairways or shelves built in the kitchen as storage rooms. The storage floor space found in these schools was as follows: School A --eighty-eight square feet, School B --one hundred and sixty square feet, School D -- one hundred and twelve square feet, School E -- eighty-four square feet, School F--forty-eight square feet. School C had built shelves on two sides of the kitchen on which various food commodities were stored.

In all schools except C the storerooms were dry and cool. Adequate ventilation of storerooms was lacking in Schools C, D, and E. The storeroom in School C was not properly ventilated because the kitchen itself was in need of better ventilation. School D's storerooms were dry and cool because they were in the basement; however, there were

no windows or air ducts for a change of air. School F had the same disadvantages of ventilation as School D.

No school possessed insectproof storerooms and only School A could be considered as being verminproof. School B had plans for making its storeroom both insect and verminproof, but lacked the finances to do so at that time.

Shelves for storage of food were found in Schools A, C, E, and in one storeroom of School D. In Schools B, F, and in one storeroom of School D, food commodities were stacked on the floor. School B had plans for shelves to be built in the near future. All schools with shelves were guilty to a minor degree of placing some commodities on the floor.

The interior surfaces of the storerooms in Schools A, B, C, and E were of such construction as to be washable. The interior surfaces of D and F were unwashable.

The Lavatories and Dressing Rooms. Separate and suitable toilets existed for employees only in Schools A and C. Employees of School D used the faculty lavatories. The remaining schools (B, E, and F) used the same lavatories as the students.

Dressing room facilities for employees were lacking in all schools. Employees came to school dressed in their

uniforms or work clothes. Two schools even lacked facilities for their employees to hang up their coats.

All lavatories of these schools were provided with hot and cold running water, soap, and approved sanitary paper towels. Inspection of lavatories just after the lunch period revealed that very little washing of hands was done either before or after meals in any of the schools. In no school were there any wash signs in the lavatories. The lavatories, however, were moderately clean.

III. FOOD PREPARATION, FOOD SERVICES, AND FOOD DISPOSAL

Preparation. Preparation of food so as to be safe for human consumption was found to be above average in all schools. The greatest failing in this area was the lack of periodic testing of the water supply. The Health Department approved the sanitary qualities of the water supply in all schools; however, the water was tested for purity only once a year in five of the six schools. School E's water supply was tested once a month for purity.

Pastuerized milk was served in all schools in individual bottles. Sanitary straws were provided for drinking the milk from the bottles in Schools A, B, C, and E. The pupils of Schools D and F drank their milk directly from the bottles.

All six schools stated that all meat used was

officially inspected, though there was no way of checking this.

Workers in the lunch programs appeared to use good care in handling food. Because of sufficient help and adequate time in the morning to prepare for the noon meal, hasty food preparation was reduced to a minimum.

Foods which could be saved were kept in dust and verminproof containers or were refrigerated. Foods served were taken directly from the stoves and served from the same kettles in which they were cooked, thus requiring no dust or verminproof display counters or containers.

Services. The method by which food was served was quite uniform in the schools of Ravalli County. Five schools used the plate style method, in which the students' plates were filled with food by the cooks as the students filed by the serving counter. The plates were then carried to a table. School D used the family style method of serving food. The food was placed on the tables in large bowls and each student helped himself as they were passed around.

The silverware of these schools appeared to be of good quality and in good condition. Most silverware had been purchased fairly recently and its wearing qualities were as yet undetermined.

Table cloths were not used by any of the schools. The table tops were cleansed with a wet cloth after each shift of meals in all schools except F. In School F the gymnasium seats served as tables and they were swept with a broom after all had eaten.

Disposal. The garbage of all schools was picked up every day. The majority of the individuals who picked up the garbage used it for pig feed.

Schools A, B, and C stored their garbage outside on a porch or step. Schools D, E, and F had no separate room for storage, so garbage was kept in the kitchen until picked up. The garbage cans were kept covered in all the schools, and all papers were burned.

Regular disinfecting of garbage cans was carried out by Schools A and E. Schools B and D washed their garbage cans regularly, but used no disinfecting process. Schools C and F neither washed nor disinfected their cans regularly.

IV. PERSONNEL

All the employees in the lunch programs were women of middle age, and they appeared to be in good health. The cooks of five schools, supposedly, had yearly health examinations. The cooks in School A had health certificates.

Student help was used in all schools except School D. These students received their meals free for such

services as scraping dishes, setting tables, taking lunch tickets, and cleaning table tops.

Workers were clean in person and clothing in all of the schools. The employees in School A wore white uniforms and those in Schools B, C, D, and E wore clean aprons over their dresses. Common street clothes, with no aprons, comprised the dress of the lunchroom workers in School F. The hair of the employees was well combed, but only the cook in School D and one cook in School E wore a hair net. All workers' hands appeared to be clean and their fingernails were well trimmed and clean. No open or raw wounds were observed on any of the employees and no employees were observed smoking while working.

V. CLEANING

Cleaning of equipment used in the lunch programs was quite satisfactory. Shelves, counters, tables, stoves, hoods, sinks, and refrigerators were found clean and to have had good care. The employees in School C, however, could have exercised a little more time and care in cleaning their stove and shelves.

Cloths used by employees were clean in all schools but one. Whether this was a common practice in that school or not was not known.

Eating and drinking utensils were pre-rinsed in four schools. Schools D and F scraped their dishes and utensils and then began washing them. The actual washing and rinsing of dishes in the lunch programs of these schools was very efficiently and effectively done. The temperature of washing water varied in the schools from 130 to 160 degrees Fahrenheit. Temperatures of rinsing water were all above 170 degrees Fahrenheit. Frequent changing of rinsing and washing water was a practice observed by all schools. Detergent was generously used in washing dishes and utensils, and in none of the lunch programs were poisonous cleaning agents observed in use.

Dishes and utensils were drain-dried in four of the six schools. Schools B and F towel-dried their dishes and the towels were used only for that purpose. The towels used by School F were stained and in need of bleaching.

The kitchen floors in five of the schools were wet mopped after each meal. Employees in School A swept and oil mopped the kitchen floors after each meal and wet mopped them when needed. In Schools A, B, C, and E, the lunchroom floors were oil mopped each day; in schools D and F the floors were merely swept. A sweeping compound was not used by Schools D and F when they swept the floors. Wet mopping the lunchroom floors in Schools A, B, C, and E took place only when needed.

CHAPTER IV

THE IDEAL COMPARED TO THE ACTUAL SITUATIONS FOUND

The purpose of comparing the ideal lunch program to those found in these six schools of Ravalli County was to show in what ways these schools were meeting desired sanitary practices, and on what points they should strive to improve.

An ideal school lunch may be considered as one which provides nutritive value in a sanitary way as well as satisfaction and enjoyment to the students. The nutritional value of meals served by these schools was over one-third the total calories needed by students per day. All six schools served type A meals.⁴²

By far the majority of students appeared to enjoy their meal; however, dislike of certain foods by some pupils appeared in all the schools. Because the schools were small, it was probably economically impossible to offer as great a variety of foods as is found in larger schools which have cafeterias. One menu was usually available to all students, but it was changed from day to day so that a variety of food was received throughout the week.

⁴²Table II, p. 31.

I. PHYSICAL FACILITIES

Lunchrooms. Ideally the lunchroom should have ten to twelve square feet of floor space per pupil served at the largest shift. In general, the schools met this requirement fairly well. School A had thirteen and four-tenths square feet of floor area per pupil served; School B, thirteen square feet; School C eight and three-tenths square feet; School D nine square feet; School E eight square feet. School F had a space of twenty-three square feet per person if all students were served at once, because it used the gymnasium as a lunchroom.

Asphalt tile and inlaid linoleum are recognized as the most practical floor coverings for lunchrooms. Smooth, painted concrete is accepted as satisfactory. Four of the six schools had smooth concrete floors--only one was not painted. One school had an inlaid linoleum floor, the other a hardwood floor.

Recently the trend of painting the walls and ceilings of lunchrooms in soft pastel colors has been recognized as superior to high gloss enamels. The long accepted white color for a lunchroom is becoming a thing of the past. Washable lunchroom walls and ceilings are considered as desirable for sanitary reasons.

Four schools retained the old white color for their

lunchroom ceilings. One school had a light cream colored ceiling and the remaining school ceiling was the unpainted gymnasium. The walls of Schools A, C, and E were of soft pastel colors, while those of Schools B, and D were the traditional white. Red brick walls were found in School F. The lunchroom walls were clean in all schools except F; however, only in Schools A and B were the walls and ceilings washable.

The ideal ventilation system for a school lunchroom would be very hard to describe other than to mention the facts that it should insure a fresh supply of air and remove body and food odors. Eight to twenty-one cubic feet of fresh air per minute is considered as adequate ventilation. Recirculated air is considered as highly unsanitary. Commercial air washers containing sterile water, or glass, or steel filters treated with viscous oil will remove forty to sixty per cent of organisms from the air. Two most effective aerosols are triethylene glycol and propylene glycol.

The schools of Ravalli County all fall short of the desired ventilation system. Two schools had no ventilation system other than windows and two had one fan each. One school had a cold air return to the furnace room and the air was recirculated. Only one school had an acceptable system. This school had a cold air intake from the outside

of the building. The air was then passed through filters and distributed by fan. It also had a cold air return to the outside. The ventilation of these schools appeared adequate because of the climate; however, the lack of ventilation equipment should be of some significance.

The screening of lunchroom windows is considered as a desirable sanitary precaution that all schools should observe. The schools surveyed revealed the astonishing fact that not one had screened lunchroom windows.

Fifteen to twenty foot-candles of light at table level is considered as adequate. Four of the six schools (A, B, C, D) met this requirement. School E had ten foot-candles of light and School F had seven foot-candles.

No one type of table top is considered as superior to all others; therefore, table tops of linoleum, waxed hardwood, or any other materials which may be stainproof and washable are considered as acceptable. Table tops are found to be acceptable in four of the six schools. Two schools had linoleum table tops, one had varnished hardwood, and one had varnished masonite. The two schools whose table tops were not adequate were of unvarnished masonite and soft wood.

Kitchens. Kitchen size should be based on the number of people to be served. One and five tenths to two and five

tenths square feet of floor space per pupil served is ideal for a kitchen.

The kitchens in these schools were found to be far too small, with one exception. School A's kitchen had 2 square feet of floor space per pupil served. School B had .85 square feet of floor space per pupil served; School C had 1.38 square feet; School D had .68 square feet; School E had .87 square feet; and School F had .37 square feet.

The modern trend for paint in the kitchen is light, soft pastel shades. High gloss enamels are objected to because they produce glare. Ceilings and walls should be washable and clean for sanitary purposes.

The kitchens of four schools were kalsomined all white and the other two school kitchens were painted a light cream color. The ceilings and walls were clean in four of the schools. The ceilings of Schools C and F were dirty from smoke and lack of cleaning over a period of time. The walls of these two schools also showed splash stains and other marks. Schools A, B, C, and E had washable ceilings and walls, but the surfaces of the walls and ceilings were too rough for washing in Schools D and F.

The ideal ventilation system of a school kitchen might be described as one which removes smoke, steam, and food vapors and insures a constant supply of fresh air.

Fume hoods, exhaust fans, and air ducts are necessary items of equipment for good ventilation.

Kitchen ventilation of these schools was also below the desired standards. Schools C, D, and F had no ventilation system other than windows. School D was almost as bad, since it had only a cold air return. School A had one exhaust fan and a large fume hood. School B had two exhaust fans and a cold air return. Installation of the fume hood in School B had not been made at the time, although it was fixed for one. School E had a fume hood, but it lacked a fan. Only School B had screened windows that might be used to aid in ventilation.

Kitchen lighting should be twenty-foot candles for general room lighting and thirty-foot candles for mixing ingredients, inspection, and reading scales. The placing of lights so employees do not work in their own shadows is an important factor. Properly shaded and well placed incandescent bulbs are satisfactory; however, "white" fluorescent tubes give off less heat and use less electricity. Good light encourages cleaning and sanitary conditions.

The kitchens of Schools A, B, D, and F were artificially well lighted; however, they could have improved their lighting systems by better placement of lights. School A had fluorescent lighting plus two disinfectant lights which were on night and day. School B had shaded incandescent

lights. The other four schools had unshaded incandescent bulbs. School C's kitchen was quite dark because only two sixty and one one-hundred watt bulbs hung on long cords from its high ceiling. School F's kitchen was so small that one unshaded light bulb gave adequate light.

Quarry tile flooring for kitchens is considered ideal because of its resilience, durability, imperviousness, and ease of maintenance. Concrete flooring is acceptable, but it is recommended that it have a smooth finish and be painted with a soilproof or wax paint which possesses nonslip properties.

The flooring of the kitchens in these schools was in good condition and of good material. Nonslip properties were not as good as they might have been, but they all were smooth. School A's kitchen floor was concrete with a wax paint impregnated in it. Schools C and D had concrete floors painted with gray deck paint. School F had an unpainted concrete floor. The composition of the floors of Schools B and F was inlaid linoleum.

Work table tops of linoleum, stain-resistant metal, or hardwood with waterproof finish, all make good table coverings. The most desired qualities of table tops are that they have smooth surfaces and be of a nonabsorbent material.

These schools were quite consistent in their use of linoleum as table top coverings. Four schools had new linoleum for tops, while School C had varnished masonite, and School F had undesirable softwood.

Authorities recommend either the gas or electric type of stove with a solid top. Electric stoves are considered to be safer than gas. In larger city schools more specialized equipment is reducing the use of the stove.

The schools were equally divided as to the different types of stoves used. There were four gas (propane) and four electric stoves found in these schools. The stoves of these schools were a credit to them, because they were all of the latest models and in excellent condition.

Refrigeration is essential in any lunch program. Walk-in freezers will best serve schools with larger programs. Deep freeze units are also a good investment. Smaller schools find it cheaper to buy and operate a refrigerator of suitable capacity. Specific figures on refrigeration space desired per meal served were not available, therefore, the investigator used his own judgment as to the adequacies of these school facilities.

Refrigeration facilities varied from excellent in Schools A and D to none in Schools E and F. School A had a 496 cubic foot walk-in cooler in addition to a fifteen cubic foot refrigerator. School B had an eight cubic foot

refrigerator and a 320 cubic foot walk-in cooler, which was not completely installed. School C possessed one fifteen cubic foot refrigerator. Despite the fact that School D served the fewest meals, it had one of the better refrigeration systems. It possessed two refrigerators (eight and twelve cubic feet) and a sixteen cubic foot deep freezer. It seems hardly conceivable that a lunch program of any size could do without refrigeration, yet two schools, E and F, had no refrigeration facilities of any type.

For sanitary reasons enclosed cupboards are considered as necessary for storage of dishes and utensils. The material of the cupboards is not as important a factor as is the tight fitting of the doors. All the schools had good cupboards which served this purpose adequately.

During the last few years, mechanical dishwashers have become effective so that more and more sanitarians are considering them as essential pieces of equipment in school lunch programs. Mechanical dishwashers have yet to make their appearance in the schools of Ravalli County.

Proper water temperatures for dishwashing is one of the most important sanitary factors in any school lunch program. Electric or auxiliary heaters are necessary in the fall and spring when pressure in the main boiler is low or an insufficient amount of hot water is available.

Those schools which use auxiliary heaters for their dishwashing are always sure of a proper temperature for they are thermostatically controlled.

Facilities for maintaining the proper water temperature in the main boilers were lacking in all schools; however, these schools usually kept their boilers burning during the time school was in session, so that almost always a supply of hot water was insured. Four of the six schools had auxiliary heaters and one school had one, that hadn't been installed.

Schools should follow the same laws regarding dishes that Public Health Departments require commercial eating places to follow, these being: no chipped or cracked dishes, and no lead or cadmium utensils used.

The dishes used in these schools were of good quality and in no school were any cracked or chipped dishes observed in use. Lead or cadmium utensils were absent in all schools and utensils were exceptionally clean. The schools rank high on these three factors as compared to the ideal.

Storeroom. The buying habits of schools often determine the size of storerooms; however, it is considered as ideal to have one half square foot of floor space per meal served. Storage places should be cool and dry, adequately

ventilated, and vermin and insectproof. In addition, the interior surfaces of storerooms should be washable and food should be placed on shelves so that the storerooms may be easily cleaned.

Planned storerooms existed only in two of the schools. The storerooms in the other four schools were closets under stairs or in any space available. In general, the storerooms were small compared to the number of meals served. Only Schools B and D had adequate storage for the number of meals served. School D had the only storeroom which was not cool. No school in this survey possessed both vermin and insectproof storerooms. School A's storeroom was verminproof but not insectproof. All the others were neither vermin nor insectproof.

Food was stored on shelves in Schools A, C, and E, but the other three schools placed their food on the floors or wherever space was available.

Ventilation of storerooms seemed adequate in Schools A, B, and E; though only windows served as a means of ventilation. Two schools even lacked windows for ventilation in their storerooms.

The interior surfaces of the storerooms of Schools D and F were not washable. Those of School B were washable but couldn't be washed easily, because food was stored on the floor. The remaining three schools' storerooms were

washable.

Lavatories and Dressing Rooms. Ideally, employees should have separate and suitable dressing rooms and lavatories. Hot and cold running water, soap and sanitary towels, and wash signs should be present in the lavatories.

The situation which existed in these schools was good regarding the facilities which they had. The lavatories in these schools were clean, supplied with hot and cold running water, soap, and sanitary towels. Employees had separate lavatories in the schools which did not provide separate lavatories for them. Wash signs were not found in any school lavatory. Dressing rooms for employees were not available in any school, so employees had to come to school dressed for work.

II. FOOD PREPARATION, FOOD SERVICES, AND FOOD DISPOSAL

Preparation. Preparation of food so as to be safe for human consumption could be rated very high in the schools visited. Workers used care in handling food because they had plenty of time for preparation of the noon meal. Food which was kept over was placed in the refrigerator or in dustproof containers. All meat used was officially inspected and pastuerized milk was served in all schools. Sanitary straws were provided for drinking the milk from

individual bottles in four schools. The greatest failing of the schools in food preparation was the lack of frequent testing of the sanitary qualities of the water supply. The State Health Department approved the sanitary qualities of the water supply in all schools, but in five of the schools, the water was tested only once a year. The sixth school had its water supply tested monthly.

Services. The ideal method of serving food in school lunch programs is cafeteria style, but the size of the programs found in these schools made it economically impossible. Five of the six schools used the plate style method of serving, with the cooks filling the plates as the pupils passed in line. The sixth school served food family style.

Silverware used by the schools was in good condition and of good quality.

Table cloths were not used in any of the lunch programs. This practice of not using table cloths is no longer considered unsanitary if table tops are cleansed after each shift. Cleaning the table tops after each shift was very conscientiously done in all schools.

Disposal. Garbage disposal and factors in connection with garbage disposal are closely related to the sanitary condition of a lunch program. Garbage must be disposed of

every day or else refrigerated. A separate room should be provided for garbage storage and washing of cans. Garbage cans should be kept covered and disinfected regularly.

Garbage of these schools was picked up every day by private individuals. Storage of garbage was inadequate in all schools, being placed on an outside porch or kept in the kitchen until picked up. The cans were covered in all schools, but regular disinfecting of garbage cans was carried out by only two schools. Two schools washed their garbage cans regularly and the remaining two left it up to the private individuals to clean the cans.

III. PERSONNEL

The personnel of any lunch program must meet specific requirements in order to insure a safe sanitary program. All cooks should have yearly health examinations. When administrators were confronted with this question, "Do the cooks have yearly health examinations?", the almost uniform answer was "Yes." The fact that one administrator didn't know whether his cooks had health examinations raised some question as to the reliability of the other answers.

The appearance of the workers' clothing in the schools was very good. The workers in School A were exceptionally neat and clean in their white uniforms. The employees in Schools B, C, D, and E all wore clean aprons. The employees of School F wore their street clothes with no aprons.

Workers are required to wear hair nets, but the personnel in School D and the cook in School E were the only employees conforming to the requirement.

Personnel found in these programs had well kept hands and nails well trimmed. No employee had any open or raw wounds and not one case of smoking by any employee was witnessed.

With the exception of wearing hair nets, the personnel in these programs could probably meet the most rigid tests for employees in a school lunch program.

IV. CLEANING

Cleanliness in the lunch programs was, on the whole, average or a little above average. The equipment of the schools was found to be clean both to sight and touch. Cloths used by employees were clean with but one exception.

Dishwashing, which is considered one of the most important sanitary factors in a school lunch program, is considered to be more sanitary if a mechanical dishwasher is used. Hand washing can be just as effective if care is used. Hand washing in the schools visited was very effective and sanitary.

Ideally all eating and drinking utensils should be pre-rinsed. Exceptions to this practice were found in Schools D and F.

Washing water should be of 120 to 140 degrees Fahrenheit. All schools were found to use water within this range and one school even had higher washing water temperatures. Rinsing water should have a temperature of 170 degrees Fahrenheit. Here again all schools met the requirement.

An adequate and sufficient amount of detergent was used in washing dishes in all schools, and at no time did soap suds or bubbles disappear from the washing water in any school. The washing water was changed frequently and new detergent added whenever the water got dirty.

No poisonous cleaning agents were used or seen in any of the schools.

Sanitarians believe in drain-drying of dishes; however, if dishes are towel dried, towels should be clean and used for no other purpose. Four of the six schools drain-dried their dishes and the other two used towels. These two schools, which towel dried their dishes, used the towels for that purpose only; however, School F's towels were not as clean as they should have been.

Wet mopping of kitchen and lunchroom floors after each meal is an ideal sanitary practice. If floors are swept, a sweeping compound should be used. Five of the six schools wet mopped their kitchen floors each day. The sixth school oil mopped the kitchen floor and wet mopped

it when needed. Lunchroom floors were oil mopped each day in four of the schools. The lunchroom floors in the other two schools were swept each day and mopped when needed. Neither of these schools, which swept their lunchroom floor, used a sweeping compound.

CHAPTER V

SUMMARY AND CONCLUSIONS

The survey on the sanitary conditions of the hot lunch programs in the six high schools of Ravalli County yielded results that one might assume to be roughly similar to those found in school lunch programs in schools of the same size throughout the state. The check list used in this survey may serve as a guide by which other schools may evaluate and compare the sanitary conditions of their lunch programs with the conditions found in these schools.

Limitations of the Study. The study of the sanitary conditions in school lunch programs was limited to the six largest schools in Ravalli County. These schools varied in size so as to give a fairly good representation of the types of programs one might expect to find in schools feeding one hundred to three hundred and fifty pupils. Comparisons between the findings of the survey and conditions in larger schools would not be too reliable; however, the check list could be used by the larger schools to evaluate their lunch programs in light of the desired and recommended sanitary conditions.

The study was limited to a small area in order to allow the survey to be personally conducted. The check list

was not mailed to any schools because of its length and the nature of the problem involved. Then too, it was hoped to avoid the natural tendency for the person filling out the check list to paint a rosy picture of his lunch program.

Summary. Physical facilities play a very important role in determining the sanitary qualities of any lunch program. The schools of Ravalli County afford a good opportunity for comparison of sanitary conditions in the school lunch programs in older buildings with those in the newer buildings. The prerequisite of adequate space and physical facilities for a lunch program have been fully recognized by two schools and the result has been new buildings with such facilities as to be comparable with any lunchrooms or kitchens within the state. The other schools present the picture of the dark basement lunchrooms and kitchens, cramped for space and short of facilities, which prevents them from carrying on the most efficient and sanitary lunch program.

The kitchens, lunchrooms, and storerooms were, in general, too small and lacked proper ventilation. Lighting presented a problem in most schools, but could have been easily remedied if so desired. Equipment in the lunchrooms and kitchens, however, was of good quality, in good condition, and adequate, with a few minor exceptions.

Unscreened windows, lack of refrigeration in two schools, and multi-uses of the lunchrooms were some of the more important undesirable conditions found.

Separate lavatories and dressing room facilities for employees were absent in almost all schools.

Food preparation, disposal, and services were average or above. The two most unsanitary conditions in this area were the lack of periodic testing of the water supply and regular disinfecting of garbage cans.

Personnel in the lunch programs were neat and clean appearing, but the requirement of health examinations for the workers was lax.

Cleaning of equipment and dishwashing were exceptionally well done; however, lunchroom floors failed to receive the cleaning desired.

The conditions such as exist in the lunch programs of these schools cannot be criticized too greatly because of the need to adapt to over-crowded schools, but improvement of some conditions could be accomplished without undue hardships being placed on the schools.

Conclusions. School feeding has placed a tremendous load on the schools of today with most emphasis being placed on the dietary aspect of the meal. As a result, adequate sanitary conditions have suffered.

The sanitary conditions of the school lunch programs of Ravalli County could stand improvement and most school officials seem to be interested in trying to improve their programs as much as financial conditions will permit. Lack of space will always be a hinderance to sanitation unless new buildings are provided in several of the schools. The sanitary conditions found in the lunch programs of these schools probably could be considered as average in comparison to other schools.

Recommendations. In view of the findings it appears desirable (1) to place more stress on sanitary conditions of school lunch programs by supervising authorities; (2) to require yearly health examinations of all employees; (3) to require periodic frequent checks to be made on the sanitary qualities of the water supply.

Need for Further Investigation. In conducting this research great difficulty was experienced in locating authoritative information on the best type or types of school ventilation, not only for lunchrooms but for classrooms as well. Since ventilation was poor in all these school lunch programs, it appeared that there was need for further investigation on school ventilation.

Adequate financing of the school lunch program also presents a problem for most school officials. Because this

is a problem now, a study of the means of financing the lunch programs after the Federal Government withdraws its matching provisions in 1956, as set up in the School Lunch Act, would be very beneficial.

Another point open for investigation is the matter of the standards by which the state department of this or any other state determines the sanitary conditions of a school lunch program.

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APPENDIX

CHECK LIST

Name of School _____

Location _____

I. GENERAL INFORMATION	<u>YES</u>	<u>NO</u>
A. Average number of pupils served per day_____.		
B. Does this include both high school and grade school pupils served?	_____	_____
C. What is the cost to pupils for meals?_____		
D. Do underprivileged students have to pay for meals?	_____	_____
E. What per cent of food served are U. S. D. A. commodities? _____		
F. How much Federal Government reimbursement is received per meal?_____		
G. What type meals are served? _____		
H. Are meals served in shifts?	_____	_____
I. Are the lunchroom and kitchen used for any other purpose other than for lunch services? If so, what? _____	_____	_____
J. Floor plan of kitchen and lunchroom is shown on the back of this sheet.		
 II. PHYSICAL FACILITIES		
A. LUNCHROOM		
1. Is the paint of the lunchroom a light color?	_____	_____
2. Are the walls and ceiling clean?	_____	_____
3. Are the walls and ceiling washable?	_____	_____
4. Is the lunchroom well ventilated?	_____	_____

- | | <u>YES</u> | <u>NO</u> |
|--|------------|-----------|
| 5. Does it have a ventilation system other than windows? If so, what type? | _____ | _____ |
| 6. Are the windows screened? | _____ | _____ |
| 7. Is the lunchroom artificially well lighted? | _____ | _____ |
| 8. Number, size, and location of windows.
_____ | | |
| 9. What is the composition of the floor?
_____ | | |
| 10. What is the composition of the table tops?
_____ | | |
| 11. Type of heating in the lunchroom?
_____ | | |

B. KITCHEN

- | | | |
|--|-------|-------|
| 1. Is the paint of the kitchen a light color? | _____ | _____ |
| 2. Are the walls and ceiling clean? | _____ | _____ |
| 3. Are the walls and ceiling washable? | _____ | _____ |
| 4. Is the kitchen well ventilated? | _____ | _____ |
| 5. Does it have a ventilation system other than windows? If so, what type? | _____ | _____ |
| 6. Are the windows screened? | _____ | _____ |
| 7. Is the kitchen artificially well lighted? | _____ | _____ |
| 8. Number, size, and location of windows?
_____ | | |
| 9. Composition of the floor?
_____ | | |
| 10. Composition of the work table tops?
_____ | | |

	<u>YES</u>	<u>NO</u>
11. Type of stove used? _____		
12. Does it have a fume hood?	___	___
13. Is there an exhaust fan for removal of odors?	___	___
14. Size of refrigerator or deep freeze? _____		
15. Are enclosed cupboards provided for storage of dishes and utensils?	___	___
16. Does the school possess a mechanical dishwasher?	___	___
17. Are there facilities for maintaining proper water temperatures?	___	___
18. Is there an auxiliary heater for water?	___	___
19. Are cracked or chipped cooking dishes used?	___	___
20. Are any lead or cadmium utensils used?	___	___
21. Are utensils clean to sight and touch?	___	___
C. STOREROOMS		
1. Size of storerooms? _____		
2. Is storeroom adequately ventilated?	___	___
3. Is storeroom dry and cool?	___	___
4. Is it verminproof and insectproof?	___	___
5. Is food stored on shelves above floor so it is clear for cleaning?	___	___
6. Are interior surfaces washable?	___	___
D. LAVATORIES AND DRESSING ROOMS		
1. Do employees have separate and suitable toilet?	___	___

	<u>YES</u>	<u>NO</u>
2. Do employees have dressing room facilities?	_____	_____
3. Are student and employees lavatories provided with hot and cold running water?	_____	_____
4. Are they clean?	_____	_____
5. Are soap and approved sanitary towels available?	_____	_____
6. Are wash signs placed in lavatories?	_____	_____
 III. FOOD PREPARATION, SERVICES, AND DISPOSAL		
A. PREPARATION		
1. Is food prepared so it is safe for human consumption?	_____	_____
2. Has the Health Department approved the sanitary qualities of the water supply?	_____	_____
3. How often is the water tested for purity?	_____	_____
4. Is pasteurized milk served?	_____	_____
5. Are sanitary straws used for drinking milk from bottles?	_____	_____
6. Is all meat officially inspected?	_____	_____
7. Do workers exercise care in handling food, food utensils, and containers?	_____	_____
8. Is food kept inclosed in closed, dustproof, and verminproof containers?	_____	_____
 B. SERVICES		
1. Is food served cafeteria, plate, or family style? _____		
2. Is silverware used in good condition?	_____	_____
3. Are table cloths used? If so, are they changed each day?	_____	_____

	<u>YES</u>	<u>NO</u>
4. Are the table tops cleaned after each shift?	_____	_____
C. DISPOSAL		
1. How is garbage disposed of? _____		
2. Is there a separate room for garbage storage?	_____	_____
3. How often is garbage removed? _____		
4. Are garbage cans covered?	_____	_____
5. Are garbage cans disinfected regularly?	_____	_____
IV. PERSONNEL		
1. Do the cooks have yearly health examinations?	_____	_____
2. Are students used in lunch services?	_____	_____
3. Are the workers clean in person and clothing?	_____	_____
4. Do all workers wear hair nets or appropriate hair covers?	_____	_____
5. Are hands of workers clean and nails well trimmed and clean?	_____	_____
6. Do workers cover the nose and mouth when coughing or sneezing and wash their hands after using a handkerchief?	_____	_____
7. Do any employees have open or raw wounds?	_____	_____
8. Do employees smoke while working?	_____	_____
V. CLEANING		
1. Is all equipment, including counters, shelves, tables, refrigerators, stoves, hoods, and sinks clean?	_____	_____
2. Are cloths used by employees clean?	_____	_____

	<u>YES</u>	<u>NO</u>
3. Are eating and drinking utensils pre-rinsed?	---	---
4. Is washing and rinsing water of adequate temperature?	---	---
5. Is an adequate and sufficient amount of detergent used?	---	---
6. How are dishes and utensils dried?		
<hr/>		
7. If drying cloths are used, are they clean and used for no other purpose?	---	---
8. Is washing water kept reasonably clean?	---	---
9. Are cleaning agents used nonpoisonous?	---	---
10. Are kitchen floors mopped each day? If not, is a sweeping compound used in sweeping?	---	---
11. Are the lunchroom floors mopped each day? If not, is a sweeping compound used in sweeping?	---	---