



EQUIPPING SCHOOL KITCHENS TO PREPARE HEALTHFUL MEALS

A PUBLICATION FOR CHILD NUTRITION PROFESSIONALS FROM THE NATIONAL FOOD SERVICE MANAGEMENT INSTITUTE

OVERVIEW

A cornerstone of Child Nutrition Programs (CNP) is the production of meals meeting nutrition standards and student preferences. The foodservice equipment used in school kitchens for the production of meals is a critical element in achieving this goal. However, little research has been conducted on the status of foodservice equipment in the nation's schools or issues related to equipment purchasing.

This issue of *INSIGHT* describes a comprehensive study conducted by the National Food Service Management Institute (NFSMI) on foodservice equipment issues related to the use of *Dietary Guidelines for Americans* (DGA) in menu planning. The project gathered opinions of school foodservice (SFS) directors on key equipment issues and determined the type of preparation equipment needed in schools to produce student-acceptable menus that comply with U.S. Department of Agriculture (USDA) nutrition standards. SFS directors can use this information to evaluate their present kitchens and effectively plan food production units equipped for the future.

RESEARCH

Several trends in school foodservice influence the type of equipment found in kitchens. An increased emphasis on the nutritional quality of meals served is challenging CNP professionals to plan and prepare healthful meals that are acceptable to children. School menus are expanding, and the number of menu choices offered to all ages of children are increasing. Attention is being given to enhancing the presentation of well-prepared food to make it appealing to students. Because students are eating outside the home more often and have more sophisticated palates, they expect food quality and presentation techniques similar to that found in the retail marketplace.

Foodservice equipment is a critical element in addressing these trends. The availability and use of foodservice equipment in schools are topics rarely studied. In addition, no research examining the use of foodservice equipment in relation to the USDA's "School Meal Initiatives for Healthy Children" was found in the literature.

OBJECTIVES

In recognition of the need for research on equipment used in school foodservice, NFSMI staff initiated a project to

- examine production equipment issues related to achievement of the DGA and
- develop equipment guidelines for the type and amount of food preparation equipment necessary for producing menus planned in accordance with the DGA.

METHOD

In the first portion of this project, NFSMI researchers conducted a national study to determine SFS directors' opinions about the use and appropriateness of equipment in school foodservice. We mailed questionnaires to a national random sample of four thousand SFS directors. A total of 2,245 (56%) directors returned surveys. In the second part of the study, a national panel of experts developed a set of foodservice equipment guidelines for school kitchens.

SFS DIRECTORS' OPINIONS ABOUT EQUIPMENT

Do SFS directors' opinions about foodservice equipment and its use reflect an increased emphasis on the DGA? We asked SFS directors to give us their opinions on how appropriate 31 pieces of equipment are for storage, preparation, or service of meals in school foodservice. More SFS directors (96%) rated convection ovens **somewhat appropriate** to **very appropriate** than any other piece of equipment. Other equipment rated by 75% or more of the directors as appropriate for school kitchens are listed in *Figure 1*. Seventy-three percent of SFS

directors thought ranges were appropriate, but only 45% gave deep-fat fryers a similar rating.

We also asked SFS directors to rate their level of agreement with 37 recommendations associated with the use of equipment in schools. *Figure 2* presents the percentage of directors who selected **agree** or **strongly agree** for 10 statements related to production equipment needed in conventional food production systems. The statement with the highest level of agreement was *additional refrigerated space is needed when fresh fruits and vegetables are offered* (89%). Less than 50% of foodservice directors agreed or strongly agreed with several statements. Two of these statements include *fryers should be used to prepare some food items served in schools* (39%) and *cooking food items in pots on top of a range is an appropriate method of food preparation in schools* (23%).

SFS directors told us how food was being prepared and served for their elementary, middle/junior high, and high schools. By far, most of the

DO SFS DIRECTORS' OPINIONS
ABOUT FOODSERVICE EQUIPMENT
AND ITS USE REFLECT AN
INCREASED EMPHASIS IN THE DGA?

directors reported that their schools were using on-site, conventional food preparation for elementary (76%), middle/junior high (69%), and high schools (68%). In other words, all menu items are prepared and served at the same site.

We concluded from this portion of the study that SFS directors' opinions about equipment use in kitchens reflect an increased awareness of preparing school meals that carry out the principles of the DGA. Less than half of the directors said that deep-fat fryers were appropriate for school kitchens and agreed with the statement *fryers should be used in high schools*. Directors showed this increased awareness of nutrition and its relation to food preparation techniques through their responses to statements such as: *cooking food items in pots on top of a range is an appropriate method of food preparation in schools and vegetables should be prepared in steamers*. Less than one-fourth of the directors agreed with using ranges to cook food items, while more than three-fourths of the directors agreed with the use of steamers.

PREPARATION EQUIPMENT GUIDELINES

What preparation equipment is needed in schools to produce student-acceptable menus that comply with USDA regulations? SFS directors and managers across the country are examining ways to manage this equipment dilemma placed before them. Although they have a general knowledge about the foodservice equipment in their kitchens, many can benefit by improving their expertise in identifying and purchasing what is best for their unique operation. Directors and managers alike are demanding foodservice equipment that provides flexibility and high-speed production. They also want preparation equipment that is versatile and enables foodservice staff to prepare menu items that are acceptable to children and comply with USDA regulations.

The second phase of the NFSMI project was to develop guidelines for preparation equipment needed in schools with conventional food production systems because our research showed that approximately 70% of schools in the United States use this type of system. We started this project with the belief that the menu is the nucleus around which all foodservice equipment purchases should be planned. Any equipment item purchased should be examined in relation to how it will enhance the preparation of food children will eat.

WHAT PREPARATION EQUIPMENT IS NEEDED IN SCHOOLS TO PRODUCE STUDENT-ACCEPTABLE MENUS THAT COMPLY WITH USDA REGULATIONS?

The first step in this project was to develop cycle menus that could serve as the basis for planning foodservice equipment in school kitchens. NFSMI staff developed two sets of two-week menus with choices for breakfast and lunch and analyzed the menus using USDA-approved nutrient analysis software. Next, we asked a panel of SFS directors/supervisors to review the menus and determine if they met USDA regulations, were consistent with the nutrition principles of

FIGURE 1

WHAT EQUIPMENT ITEMS DO FOODSERVICE DIRECTORS BELIEVE ARE APPROPRIATE FOR SCHOOLS?^a

- Convection Ovens (96%)
- Drop-sided milk coolers (88%)
- Steam-jacketed kettles (85%)
- Food cutters/choppers (83%)
- Deck ovens/stack ovens (77%)
- Mobile serving carts (kiosk) (75%)

^a Percent selecting *somewhat appropriate* to *very appropriate* on a scale from *very inappropriate* to *very appropriate*

the DGA, and represented menus served in schools. After alterations were made based on expert opinions, we used the cycle menus as the foundation for planning the preparation equipment needed in school kitchens.

A variety of foodservice equipment is needed to prepare breakfast and lunch meals in school kitchens with conventional food production and service. Types of equipment typically found in foodservice operations include chilled/frozen storage, preparation-including pre-preparation, service, and warewashing. This project focused solely on the preparation equipment in conventional school kitchens. We defined preparation equipment as equipment used to:

- prepare food items for cooking (mixer, slicer, and food processor),
- cook food products (convection oven, braising pan, kettle, steamer, and range), and
- hold food for service (heated cabinets and refrigerators).

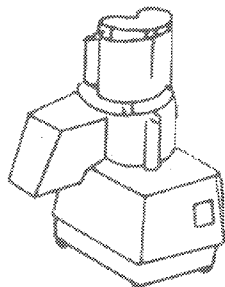
NFSMI staff developed preparation equipment guidelines for three sizes of conventional school kitchens based on the approved cycle menus with choices. The three sizes were school kitchens that prepared 400 meals or less, 401-700 meals, and 701-1,000 meals.

We then worked with another panel of experts to validate the equipment guidelines. This national panel consisted of SFS directors, a foodservice consultant specializing in facility design, an equipment manufacturer's representative, and a university professor whose expertise is quantity food production. Panel members reviewed the guidelines to determine if the menus could be prepared using the equipment listed for the three sizes of kitchens. We revised the guidelines to incorporate changes based on proposed food production demands suggested by the expert panel. The preparation equipment guidelines recommended for the three sizes of school kitchens are shown in Figure 3.

Although every school district is unique, these guidelines provide a baseline for the types and capacities of preparation equipment that we believe are needed in conventional kitchens. We realize that many schools are offering choices of menu items. The equipment was sized to have sufficient capacity for foodservice staff to prepare choice menus. We also recognize the financial constraints under which

FIGURE 2

DO FOODSERVICE DIRECTORS AGREE WITH STATEMENTS ABOUT EQUIPMENT USE IN SCHOOLS?^a



- Additional refrigerated space is needed when fresh fruits and vegetables are offered (89%)
- Healthy meal choices should be merchandised (89%)
- Milk coolers should be accessible for all children to serve themselves (86%)
- Additional serving line space is needed when menu choices are offered (86%)
- Back-up refrigerators and warmers close to the serving line are necessary when offering menu choices (83%)
- Self-service food bars are appropriate for junior/senior high school students (76%)
- Vegetables should be prepared in steamers (76%)
- Smaller capacities of kettles or braising pans are needed when choices of entrees are offered (55%)
- Fryers should be used to prepare some food items served in schools (39%)
- Cooking food items in pots on top of a range is an appropriate method of food preparation in schools (23%)

^a Percent selecting agree to strongly agree on a scale from strongly disagree to strongly agree

FIGURE 3

PREPARATION EQUIPMENT GUIDELINES FOR CONVENTIONAL KITCHENS

PREPARATION EQUIPMENT	MEALS PREPARED PER DAY		
	<400	401-700	701-1000
CONVECTION OVENS	(1) double	(2) double	(3) double
TILTING BRAISING PANS	(1) 23 or 30 gallon	(1) 23 or 30 gal. and (1) 40 gal.	(2) 40 gallon
KETTLES	(1) 10 gallon	(1) 10 gallon	(1) 10 gal. and (1) 20 gal.
STEAMERS	(1) 2 compartment	(1) 2 compartment	(2) 2 compartment
RANGES	(1) 2-burner	(1) 2-burner	(1) 2-burner
MIXERS	(1) 60 qt with 30 qt attachments	(1) 60 qt with 30 qt attachments	(1) 30 qt and (1) 60 qt
SLICERS	(1) automatic	(1) automatic	(2) automatic
FOOD PROCESSORS	(1) table top	(1) table top	(1) table top
HEATED CABINETS: Pass-thru or Reach-in	1 section	2 section	3 section
REFRIGERATORS: Pass-thru or Reach-in	1 section	2 section	2 section

school districts operate and tried to be realistic about what preparation equipment is necessary to produce school meals that are acceptable to children.

EQUIPMENT DESCRIPTIONS

For SFS directors who are unfamiliar with the equipment listed in the guidelines or want more information about individual items, we prepared a user-friendly manual with detailed equipment descriptions for each recommended

equipment item. The manual is organized by equipment type and provides information about construction and capacity. In addition, we generated questions to consider when making purchase decisions. For example, questions to pose when purchasing convection ovens are listed in Figure 4. The manual provides a similar list of questions for each equipment type along with reproducible forms for use in documenting communication with equipment suppliers and manufacturer's representatives. The complete reference for the manual is listed on the back, and it can be ordered from NFSMI.

PRACTICAL USE OF THIS INFORMATION

Today's CNPs are operating in an environment of change. To assure CNPs meet present and future needs, SFS directors must respond to the demands of their consumers and government regulations. They can enhance their programs' production capabilities by purchasing equipment that incorporates innovative technologies. New or improved foodservice equipment will enable schools to achieve exceptional performance goals. SFS directors can broaden their production knowledge by observing other segments of the foodservice industry. Equipment manufacturers are developing new and improved production equipment for other segments, such as health care, and school foodservice directors can benefit from others' experiences.

forms can be used to compare equipment manufacturers' catalog sheets, ask questions of manufacturer's representatives, and obtain help in writing specifications.

The purchase of foodservice equipment is a long-term investment for any school district; therefore, it is to the CNP's advantage that the SFS director be actively involved in the planning process for new construction as well as renovation projects and replacement of equipment. It is to the benefit of SFS directors that sound business decisions are made initially concerning the needs of the CNP operation. Before making decisions, talk to other foodservice directors and managers about the equipment under consideration. Remember that some of the best resources are peers; listen to their opinions and success or horror stories. Discover how they use the equipment and decide whether your expectations are similar. If possible, take some of your staff to a school that has this equipment to see it in operation. Any new equipment item should be safe, reliable, easy for staff to operate and, in addition, provide flexibility in meeting production needs. Above all, maintain your focus on customers by purchasing equipment that will enable foodservice staff to prepare and serve appealing meals that children will eat.

SFS DIRECTORS CAN USE INFORMATION FROM THIS STUDY AS A REFERENCE GUIDE FOR THE TYPES AND CAPACITIES OF PREPARATION EQUIPMENT RECOMMENDED FOR SCHOOL KITCHENS.

The findings from this study confirm a relationship between equipment and implementation of the DGA in CNPs. SFS directors can use the information from this study as a reference guide for the types and capacities of preparation equipment recommended for school kitchens. Foodservice facilities consultants and kitchen planners should find this information helpful in designing kitchen facilities for schools.

The questions developed for each equipment item (Figure 3) were used to generate user-friendly forms leading a purchaser through the process of asking important questions (Figure 4). These can be used by SFS directors to enhance their equipment decision making process. The

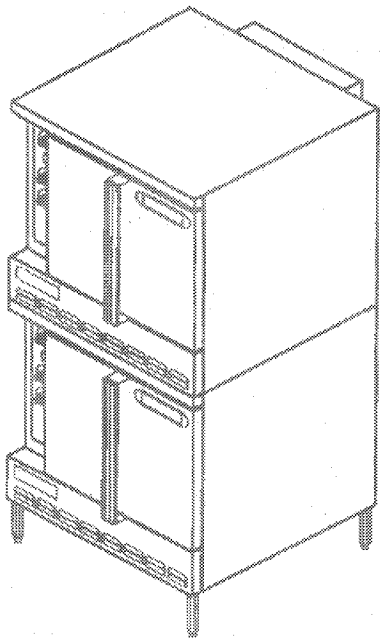


FIGURE 4

CONVECTION OVEN DESCRIPTION AND QUESTIONS TO CONSIDER

MEALS PREPARED PER DAY	NUMBER AND TYPE EQUIPMENT
<400	(1) double full size convection oven
401-700	(2) double full size convection ovens
701 - 1000	(3) double full size convection ovens

DESCRIPTION

Convection ovens differ from other ovens in that fans are used to provide rapid circulation of heated air within the cooking chamber. Since heat transfer into food products is increased by the force of the heated air, a lower temperature and shorter cooking time may be used.

Convection ovens are available in both gas and electric. These ovens can be purchased in half or full size units. Half size ovens hold 13"x18" baking pans while 18"x26" pans can be used in the full size oven. Steamtable pans can be used in both, but pan capacity will be greater in the full size unit. Both the half and full size ovens are available as single or double units. The single unit is one oven on approximately 25" legs while the double unit is two ovens on approximately 6" legs. The advantage to the double unit is that there is twice the capacity in the same amount of floor space. A possible disadvantage is that the higher racks in the top oven and the lower racks in the bottom oven may not be utilized to full potential due to lack of accessibility by staff.

The oven exterior can be high-heat aluminum, 16 to 20 gauge stainless steel, 14 to 20 gauge steel with porcelain or vitreous enamel finishes, or other baked on finishes. The majority of oven interiors are comprised of porcelain-enameled or stainless steel finishes.

Sizes of ovens vary with manufacturers, but a typical full size convection oven measures approximately 36" wide by 37" deep. Nine to eleven rack guides are provided; however, five racks are the standard amount provided with each oven. Additional racks may be purchased. Manufacturers are building a new generation of convection ovens that have increased cooking capacity of up to 17 racks. Roll-in convection ovens also are available for high production operations.

One innovative type of oven is the combination convection oven/steamer. The greatest benefit of combination convection oven/steamer is that two separate conventional cooking techniques are combined into a single piece of equipment. These units have three cooking modes: steam, hot air, and combination. The combination mode blends the advantages of steam cookery with those of the convection oven to steam, blanch, poach, bake, roast, and rethermalize food products that are moist and nutritious.

QUESTIONS TO CONSIDER

- How many meals are to be prepared?
- Do I need a single or double oven?
- What types of food products will be prepared in this oven?
- Does this oven have the necessary capacity to allow for increased production due to participation growth?
- Does this oven provide production flexibility?
- How often and for how many items will this oven be used?
- What power requirements are necessary? Do I have the necessary utilities available in this kitchen? If not, how much will it cost to obtain necessary utilities?
- Do I need a gas or an electric oven?
- How many KWs or BTUs does this oven use? Is it energy efficient?
- If I purchase a gas oven, are there any electrical connections required?
- What are the dimensions of this oven? Will it fit in the space available in this kitchen?
- What is the life expectancy for this oven?
- Is the oven NSF listed and AGA design certified or UL listed?
- What are the ventilation requirements for the oven?
- What optional features do I need?
- Do I want to purchase additional oven racks?
- Are legs included with this oven?
- What control panel options do I need?
- What is the temperature range of this oven?
- Is the oven easy to operate?
- Is the oven easy to clean?
- What preventive maintenance procedures are recommended?
- What do I need to know about this oven's heat transfer mechanism?
- How long does it take the oven to pre-heat?
- What are the differences in door construction?
- Who is the factory authorized service agent for this oven?
- How long does it take to receive replacement parts and where are they inventoried?
- What is the warranty and what is covered?
- Is an extended warranty available?
- What is the budget cost for this oven?
- What exterior finishes are available for the sides, legs, and back panel? What is the cost differential?
- Do I need a glass insert in the door or can it be solid?
- Do I need a training demonstration on the operating, cleaning, and preventive maintenance procedures for my employees? If so, is there any additional cost for the training?
- Does the manufacturer provide a videotape that I can use to train new employees?

FOR MORE INFORMATION

RESOURCES:

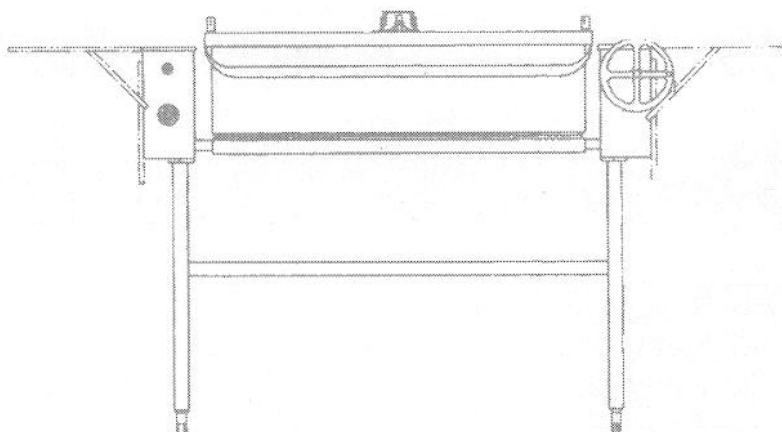
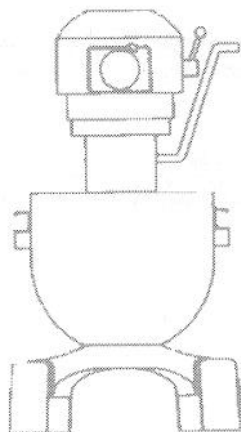
Nettles, M.F. (1996). *Issues related to equipment and the Dietary Guidelines for Americans*, NFSMI-R24-96. University, MS: National Food Service Management Institute.

Nettles, M.F., and Carr, D.H. (1996). *Guidelines for equipment to prepare healthy meals*, NFSMI-R25-96. University, MS: National Food Service Management Institute.

NFSMI. Champions of change: child nutrition personnel, TT102595, University, MS: author.

NFSMI. Go for the gold with customer service, ET9-94, University, MS: author.

NFSMI. Participation: The key to healthy food practices. TT30994, University, MS: author.



Information about this and other topics may be obtained by contacting the

NATIONAL FOOD SERVICE MANAGEMENT INSTITUTE

The University of Mississippi

Telephone: 800-321-3054

Order Number R106-96

Authors: Mary Frances Nettles, PhD, RD, Deborah H. Carr, MS, RD, and Martha T. Conklin, PhD, RD. Dr. Nettles is a Research Scientist, Ms. Carr is a Research Associate, and Dr. Conklin is the Director, Division of Applied Research, National Food Service Management Institute, The University of Southern Mississippi, Hattiesburg, MS. November 1996.

This project was funded at least in part with Federal funds provided to the National Food Service Management Institute at The University of Mississippi from the U.S. Department of Agriculture, Food and Consumer Service under Grant number F33385. The contents of this publication do not necessarily reflect the view or policies of the U.S. Department of Agriculture, nor does mention of trade names, commercial products or organizations imply endorsement by the U.S. government.

© National Food Service Management Institute

The National Food Service Management Institute is an Affirmative Action/Equal Opportunity Employer and does not discriminate on the basis of age, race, color, sex, pregnancy, religion, marital status, national origin, disabilities, or status as disabled or Vietnam-era veteran.