

V. MEAL SERVICE

Several factors affect how well the Summer Food Service Program (SFSP) meets its primary goal of providing nutritious meals to children in low-income areas during the summer. Among these factors are whether sponsors follow meal pattern requirements, the types of foods they serve to meet these requirements, the settings in which meals are served, whether children like or dislike the foods, and the amount of food wasted. The on-site observations of SFSP meal service were designed to examine two research issues: (1) the quality, safety, and food and nutrient content of SFSP meals; and (2) the extent of plate waste.

The meal service findings usually are presented for all sponsor types combined. However, selected meal service characteristics and the SFSP meals' food and nutrient content also are presented separately for school sponsors and for nonschool sponsors, as different menu planning regulations apply for school sponsors (sponsors that are school food authorities [SFAs]). School sponsors may use offer-versus-serve (OVS)—a system used in school meal programs that permits children to refuse some meal components—in the SFSP. They also may choose to use either the SFSP meal pattern or the menu planning system they use for the school meal programs. Other types of sponsors must use the SFSP meal pattern and may not use OVS.

The key findings are:

- ***Most sites served meals indoors and distributed from a serving or pick-up line.*** Three-fourths of the sites (76 percent) served meals indoors; the rest served meals at outdoor locations, such as parks and playgrounds. More than 80 percent of sites had access to refrigeration.
- ***A range of foods was observed across sites in SFSP meals, with more different menus observed at lunch than at breakfast.*** SFSP breakfasts typically consisted of milk, cereal, and 100-percent fruit juice; some breakfasts included a hot main entree, such as scrambled eggs or a breakfast sandwich. A typical SFSP lunch contained milk, a sandwich or mixed dish, and a fruit and/or a vegetable. Fifty-four percent of lunches provided a cold main entree, 43 percent provided a hot entree, and 3 percent offered both options.
- ***On average, SFSP meals provided at least one-quarter of the Recommended Dietary Allowances (RDAs) for most key nutrients at breakfast, and at least one-third of the RDAs for energy and key nutrients at lunch and supper.***^{1,2} Breakfasts

¹The school meal regulations are based on the 1989 RDAs and the 1990 Dietary Guidelines (7CFR 210.10 and 7CFR 220.8). This study used the updated Dietary Reference Intakes (DRIs) RDAs for iron and vitamins A and C and the DRI Adequate Intake (AI) for calcium (Institute of Medicine 1997, 2001, and 2000b).

²Energy refers to food energy, a macronutrient, which is measured in calories (abbreviated kcal, as the technical term is kilocalories).

fell slightly below the standard for energy, providing an average of 21 percent of the RDA. Suppers fell below the standard for calcium for the older age group, providing an average of 27 percent of the Adequate Intake (AI).

- ***On average, SFSP meals did not meet nutrition standards for the percentage of calories from total fat or from saturated fat, except for total fat at breakfast.*** Neither lunch nor supper met the standards for sodium or for the percentage of energy from carbohydrate. The fat and saturated fat contents of SFSP meals were similar to those reported for school breakfasts and school lunches in 1998-1999 in the second School Nutrition Dietary Assessment Study (SNDA-II) (Fox et al. 2001).
- ***About half (55 percent) of breakfasts served by nonschool sponsors met all the SFSP meal pattern requirements, and 71 percent of lunches served by nonschool sponsors met all the requirements. The most frequent cause of noncompliance was inadequate portion sizes.*** About 22 percent of breakfasts served by nonschool sponsors included a fruit or a vegetable, but not in the required serving size. Breakfasts sometimes did not contain all the components: 14 percent of breakfasts were missing a bread/bread alternate, 6 percent were missing milk, and 5 percent were missing the fruit/vegetable component. At lunch, meals that fell short typically served all the components but did not meet the minimum serving size for some of them. For example, the meat/meat alternate was nearly always served, but 20 percent of lunches did not serve it in the required serving size.
- ***A substantial majority of sites (80 percent) served more than 90 percent of their available meals.*** When sites had leftover meals, they discarded all meals at 29 percent of sites; stored all meals at 22 percent of sites; and discarded some and stored some at 35 percent of sites. About 22 percent of sites reported that they had run out of food or meals at some point during the summer.
- ***Children wasted an average of about one-third of the calories and nutrients they were served.*** However, this fraction varied across sites and by foods. About 11 percent of meals were eaten completely, with no plate waste. At more than two-thirds of the sites (68 percent), site staff reported that the children's dislike of the food was the most common reason for waste. About 44 percent of sites provided a "share box" to encourage children to share unwanted food and to reduce food waste.³

These key findings are discussed in greater detail in the rest of this chapter. Section A presents general characteristics of SFSP meal service. Section B examines the food and nutrient content of SFSP meals, including the food items and food groups most commonly served and site staffs' opinions about the least popular and most popular food items. Section C presents information on the extent of plate waste and nutrients wasted.

³Plate waste estimates do not include leftover full meals or food items left in the share box at the end of the meal service.

A. CHARACTERISTICS OF MEAL SERVICE

Sponsors are expected to provide nutritious meals that meet SFSP regulations while controlling costs and minimizing waste. At the same time, meals must be prepared and served in an environment that promotes safe food handling practices. The way that meals are prepared, transported, served, and stored are important characteristics affecting meal quality and safety.

The data presented in this section are based on site supervisors' reports and interviewers' observations of meal operations before, during, and after meals. Almost half the sites served breakfast, and nearly all of them served lunch; about 5 percent served supper.⁴ The site data presented in this section have been weighted two ways. Data weighted with the "site weight" show the percentage of all SFSP sites with a particular characteristic (reported in the tables in the "Percentage of Sites" column); data weighted with the "site-meal weight" show the percentage of all SFSP meals served at sites with a particular characteristic (reported in the "Percentage of Meals Served" column).

1. Meal Service Characteristics

More than two-thirds of the sites (70 percent) distributed food for at least one of the observed meals from a serving line or a food pick-up line; one-third served food to seated children (Table V.1). These findings are similar to findings in the previous national study, which showed that about 80 percent of sites distributed meals to children in a serving line or food pick-up line (Ohls et al. 1988).

Eighty-five percent of sites run by school sponsors offered food in a serving line or food pick-up line; by contrast, sites run by nonschool sponsors were only slightly more likely to offer food in this way as opposed to serving meals to seated children (56 percent and 42 percent, respectively; Appendix F, Table F.1). Interviewers observed a very small percentage of sites (5 percent) in which site staff distributed meals to children dispersed throughout the site (for example, in individual classrooms, on different floors of a recreation building, or both indoors and outdoors). The majority of sites (76 percent) served their meals indoors. Most of the ones that fed children outdoors were located in playgrounds or parks.

Only 7 percent of the sites had participants assist with meal preparation or meal service. These sites generally were not school-sponsored sites (nonschool sites, 12 percent, compared with school sites, 3 percent; Table F.1).

The interviewers were not always able to observe the sites' drinking water facilities. When they could not do so, they asked site staff whether drinking water was available. Five percent of

⁴All sites in the sample served lunch, but data from the Sponsor-Site Database suggest that a few sites nationally did not serve this meal. Snacks were not observed for content, although approximately 19 percent of sites served snacks.

TABLE V.1
SELECTED MEAL CHARACTERISTICS

	Percentage of Sites	Standard Error	Percentage of Meals Served	Standard Error
Meal Service Arrangement^a (n = 161)				
Meals Served in Serving Line/Food Pick-Up Line				
Variety of food	13	(3.3)	21	(5.8)
Unitized meal	57	(5.6)	50	(5.7)
Meals Served to Seated Children				
Variety of food	2	(1.1)	8	(4.0)
Unitized meal	31	(5.2)	31	(5.7)
Meals Served to Children as They Arrive	20	(4.9)	15	(4.4)
Meals Served to Children Dispersed Throughout the Site	5	(2.2)	6	(2.3)
Sites Serving Meals				
Indoors	76	(4.3)	83	(3.6)
Outdoors	22	(4.3)	14	(3.2)
Indoors and Outdoors	3	(1.5)	4	(1.9)
Sites Where Children Assist with Meal Preparation or Serving	7	(2.7)	6	(1.9)
Sites with On-Site Drinking Water Available	53	(6.8)	63	(6.3)
Sites Serving Water with Meals	5	(2.0)	6	(2.3)
Sites with a Share Box Present at Any Meal	44	(4.9)	38	(5.1)
Sites Where These Meals or Meal Components Are Carried Off Site (n = 157):				
None	87	(3.7)	91	(2.4)
Whole Meals	3	(1.8)	3	(1.8)
Fruits and/or Vegetables Only	6	(3.4)	2	(1.2)
Other Components	4	(2.1)	4	(1.8)
Sample Size	162	—	—	—

SOURCE: SFSP Implementation Study, Site Observations (2001).

NOTE: Tabulations are weighted to be representative of sites and meals served nationally.

^aMultiple answers were possible, so total of percentages may exceed 100 percent.

the observed sites offered water to program participants as part of the meal. Only slightly more than half the sites had on-site drinking water.

To minimize waste and unusable leftovers, the SFSP encourages sites to designate “share tables” or “share boxes,” where children may return whole items that they choose not to eat. Site staff made these items available to children who wanted additional helpings (“seconds”), stored them for future use, and/or discarded them. About 44 percent of sites provided share boxes during meals (Table V.1). Most of the foods placed in the share boxes during site visits were cold items, such as unopened cartons of milk, fruit juices, fruit, and packaged sandwiches. Some hot items, such as breakfast sandwiches, burritos, scrambled eggs, and chicken nuggets, also were placed in the share boxes.

Full meals or parts of meals generally may not be taken off site, but state agencies have the option of permitting sponsors to allow certain fruit and vegetable components to be taken off site. At the majority of sites (87 percent, serving 91 percent of all meals), no meals or meal components were observed to be carried off site.⁵ At 14 percent of the sites (serving 9 percent of all meals), interviewers observed that complete meals, fruits and/or vegetables, or other meal components were carried off site (Table V.1). It was not possible to determine whether the state agencies had given permission for the fruits and vegetables to be taken. At about 3 percent of sites, entire meals were taken off site. However, one such site was located outdoors, and the temperature was over 100 degrees on the day of the site visit.

2. Disposition of Available Meals

Almost 80 percent of site supervisors reported that their sites always had sufficient meals available to serve all of the children who came to their site; however, 22 percent of the sites did run out of food or meals at some point (Table V.2). Because attendance at any given site often varied from day to day, sponsors could not always predict the number of meals they had to have available. To control costs, sponsors had to both have enough meals for the expected number of children and minimize the amount of leftovers and unusable food items. Eighty percent of sites served more than 90 percent of their available meals on a typical day, based on interviewer observations on the day of the site visit. Some site supervisors (at sites that did not serve all their meals or food) believed that hot weather explained their site’s low attendance, and therefore, their leftovers.

According to site supervisors’ reports, two-thirds of the sites served 100 percent of their available meals as firsts, or “initial” meals. Fewer than 40 percent served “seconds,” which are leftover meals served to children as a second complete meal. About one-fifth of the sites that

⁵Interviewers were instructed to code instances in which even one child took food off site. At the same time, at large, busy sites, they may have missed isolated instances of small food items being put in pockets or backpacks. Entire meals being taken off site generally would be more difficult to miss.

TABLE V.2
DISPOSITION OF AVAILABLE MEALS

	Percentage of Sites	Standard Error
Sites that Had Ever Run Out of Food or Had Insufficient Meals for Everyone ^{a,b}	22	(4.7)
Percentage of Available Meals Served on a Typical Day ^c		
<70	7	(2.7)
70 to 79	4	(1.9)
80 to 89	9	(2.8)
90 to 99	37	(5.9)
All available meals served	44	(5.3)
Median	99.0	—
Sites Serving All Meals as Firsts ^{a,b}	64	(5.1)
At Sites Serving Seconds, Percentage of All Meals Served as Firsts ^{a,b} (n = 61)		
90 to 99	88	(3.4)
80 to 89	9	(3.0)
70 to 79	3	(1.9)
At Sites Serving Seconds, Percentage of All Meals Served as Seconds (n = 61)		
≤3	21	(5.5)
>3 to 6	18	(5.9)
>6 to 10	27	(6.6)
>10	35	(8.8)
At Sites with Leftover Meals, Excess Meals ^{a,b,d} (n = 155)		
Discarded	29	(5.1)
Stored	22	(5.1)
Some discarded, some stored	39	(5.8)
Returned to sponsor or central kitchen	15	(4.3)
Donated	4	(2.4)
Fruit given to children to take home	3	(1.7)
Sites Serving Meals Left Over from Previous Day ^b (n = 111)	75	(5.9)
Sample Size	162	—

TABLE V.2 (*continued*)

SOURCE: SFSP Implementation Study, Site Observations, and Site Supervisor Interviews (2001).

NOTE: Tabulations are weighted to be representative of sites and meals served nationally.

^aBecause site visits occurred throughout the summer, sites could be visited during the early, middle, or late part of their operations. Site supervisors' responses to this question reflected their experiences as of the date of the visit, not experiences over the full summer.

^bAs reported by the site supervisor.

^cAs observed by the interviewer on the day of the site visit.

^dMultiple responses allowed.

served seconds served fewer than 3 percent of all available meals as seconds; more than one-third served more than 10 percent of all available meals as seconds.⁶

The interviewers asked the site supervisors what site staff did with leftover meals. About 29 percent of sites with leftover meals or meal components discarded all their leftovers, whereas slightly more than 20 percent saved all their leftovers.⁷ Almost 40 percent discarded some of the meals or meal components while saving others. About 15 percent of the sites returned the leftovers to the sponsor or to a central kitchen. Only about 4 percent of the sites donated the food, and only 3 percent allowed program participants to take leftover fruit home. Three-fourths of the sites that stored meals served them the next day. Some site supervisors reported that they saved some whole items (for example, unopened juice containers from breakfast) and served them later in the day, as a snack.

3. Handling and Storage of Food

Approximately 79 percent of the sites had on-site facilities for hand washing, including such methods as a hand sanitizer or cleansing wipes (Table V.3). More indoor sites than outdoor sites had these facilities (83 percent versus 65 percent, respectively; Table F.2).

Roughly half the sites provided gloves for staff who handled food; however, gloves were worn by all of a site's food-handling staff at only 38 percent of sites. Indoor sites were more likely than outdoor sites both to provide gloves and to require all food handlers to wear gloves while preparing and serving food. However, many sites, particularly outdoor ones, served prepackaged, unitized meals, and glove-wearing is less important in these circumstances.

Most sites served food within 30 minutes after it was set out and ready to eat. Fewer than 4 percent of sites left meals sitting out for longer than 60 minutes.⁸ At outdoor sites, almost 75 percent of the meals were served within 30 minutes of being set out.

⁶SFSP regulations permit sponsors to claim a limited number of second meals served to children for reimbursement, specifically, as much as 2 percent of the number of first meals served at the sites during the claiming period. However, the study staff did not collect data on how many of the seconds that the sites served were claimed.

⁷The question on disposition of leftover meals permitted multiple responses, so that the percentages choosing the different options adds up to more than 100 percent. However, the first three options (discard all, save all, and discard some/save some) were mutually exclusive.

⁸According to SFSP regulations, meals that are prepared off site must be delivered within 1 hour of the beginning of the meal service (unless the site has adequate facilities for holding hot or cold meals within the temperature range required by state or local health regulations) and no later than the beginning of the meal service.

TABLE V.3
HANDLING AND STORAGE OF FOOD

	Percentage of Sites	Standard Error	Percentage of Meals Served	Standard Error
Food Safety and Handling				
Sites with On-Site Facilities for Hand-Washing (n = 155)	79	(4.5)	81	(3.5)
Sites Where Gloves Are Available for Staff Who Handle Food	47	(5.6)	67	(6.0)
Sites Where All Staff Who Handle and Serve Food Wear Gloves (n = 158)	38	(5.0)	48	(6.5)
Number of Minutes Food Sat Out Before It Was Served (n = 159)				
0	4	(1.9)	3	(1.6)
1 to 15	62	(5.7)	65	(6.3)
16 to 30	17	(4.0)	18	(5.1)
31 to 60	4	(2.3)	3	(1.8)
>60	4	(2.3)	1	(0.8)
Unable to observe ^a	9	(2.7)	10	(2.9)
Food Storage				
Sites with On-Site Refrigerator	80	(4.7)	88	(3.4)
Sites with On-Site Cooler	65	(5.9)	67	(4.4)
Sites with On-Site Freezer	64	(5.4)	80	(3.8)
Sample Size	162	—	—	—

SOURCE: SPSP Implementation Study, Site Observations (2001).

NOTE: Tabulations are weighted to be representative of sites and meals served nationally.

^aAs described in Appendix A, interviewers were instructed to arrive at least 30 minutes before breakfast, and 1 hour to 1 hour 30 minutes before lunch. For 9 percent of the meal observations, however, interviewers arrived late because they had difficulty finding the SFSP meal location, or because the meal service had started earlier than scheduled.

Nearly 80 percent of the sites had access to refrigerators; somewhat smaller fractions had access to coolers or freezers. Not surprisingly, indoor sites were more likely than outdoor sites to have both on-site refrigerators and freezers. Approximately 69 percent of outdoor sites had access to coolers for temporary food storage, but fewer than one-third had access to refrigerators (32 percent) or to freezers (29 percent) (Table F.2). However, none of the site supervisors cited lack of food storage facilities as the main reason why food was wasted. About two-thirds (68 percent) reported that food was wasted mainly because the children did not like it. (This issue is discussed in more detail in Section C.3 of this chapter.)

4. Meal Order Adjustment and Transport of Food Prepared Off Site

Sponsors could either prepare their own meals or contract with a vendor—a local school food authority (SFA) or a private vendor. Approximately 82 percent of sponsors prepared their meals, and 18 percent used a vendor (see Chapter II). Some sponsors prepared meals at central kitchens and then delivered them to the sites.⁹ This section examines site supervisors' experiences with order adjustment and delivery of meals at sites where meals were prepared off site.

Sponsors may have to adjust the number of meals prepared or ordered based on fluctuations in participation, with the objective of providing only one meal per child per meal service while allowing for a small percentage of seconds. Site supervisors at about 15 percent of sites that had meals delivered reported that they never adjusted their meal orders. Approximately 34 percent adjusted their meal orders daily, 21 percent did so a couple of times per week, and 31 percent did so a couple of times per month (Table V.4).

Because different arrangements could be used to transport cold food from day to day or for different meal components, site supervisors could report multiple methods for transporting to the site food items that had to be kept cold. For example, milk could arrive in a refrigerated vehicle, and cold sandwiches could arrive in coolers. Forty-eight percent of sites that had cold food delivered had at least some food delivered by a refrigerated vehicle, 50 percent had some food delivered in coolers transported in a nonrefrigerated vehicle, and about 5 percent had cold food transported in a nonrefrigerated vehicle without coolers. Another 5 percent used some other means, such as ice chests or insulated bags.

About 74 percent of the site supervisors reported that food arrived on time all the time. Most of the remaining site supervisors reported that it arrived on time most of the time.

⁹The level of on-site meal preparation varied from complete preparation of meals on site to warming of foods or assembling of meals that were delivered to the site. Because interviewers did not observe or record the level of food preparation that occurred at the sites, the information on meal preparation is based on interviews with sponsors and site supervisors (see Appendix A for further details).

TABLE V.4
MEAL ORDER ADJUSTMENT AND TRANSPORT OF FOOD
PREPARED OFF SITE

	Percentage of Sites	Standard Error	Percentage of Meals Served	Standard Error
Meal Order Adjustment Frequency (n = 71)				
Daily	34	(6.5)	36	(6.5)
A Couple of Times per Week	21	(5.7)	29	(7.6)
A Couple of Times per Month	31	(5.6)	23	(5.3)
Never	15	(5.2)	12	(4.9)
Food Transport				
Mode of Transport of Cold Food ^a (n = 70)				
Refrigerated vehicle	48	(9.5)	48	(9.4)
Cooler transported in a nonrefrigerated vehicle	50	(9.7)	47	(9.6)
Nonrefrigerated vehicle	5	(2.2)	6	(3.2)
Other	5	(3.2)	5	(2.9)
Timely Arrival of Food ^b				
All the time	74	(6.6)	75	(8.0)
Most of the time	25	(6.4)	20	(6.2)
Some of the time	1	(1.3)	5	(4.4)
Sample Size	72	—	—	—

SOURCE: SPSP Implementation Study, Site Supervisor Survey (2001).

NOTE: Tabulations are weighted to be representative of sites and meals served nationally. The sample is restricted to sites with off-site preparation of meals.

^aMultiple responses allowed.

^bBecause site visits occurred throughout the summer, sites could be visited during the early, middle, or late part of their operations. Site supervisors' responses to these questions reflected their experiences as of the date of the visit, not over the full summer.

B. CONTENT OF MEALS SERVED

Many factors contribute to providing nutritious meals to SFSP participants. Sponsors must ensure that meals follow menu planning guidelines, as specified by the U.S. Department of Agriculture (USDA). To contribute to healthy growth, meals should meet dietary guidelines for moderation in fat, sodium, and cholesterol while providing adequate calories, vitamins, minerals, and fiber. Ideally, in addition to being nutritious, the food would be liked by its recipients—the children—and waste would be minimized. At the same time, the goal of serving foods that the children will eat rather than waste may conflict with the goal of providing healthy, nutritious meals. Planning and serving meals that balance all these goals within available budgets can be challenging to sponsors.

To assess how well SFSP sponsors and sites met these goals, detailed information on SFSP meals was collected for a random sample of meals served and plate wastes at selected breakfasts, lunches, and suppers (see Appendix A). Nutritionists then used a dietary software program to enter and code information from the meal observation and plate waste forms.¹⁰ The meal analyses are based on a single day's observation at each site: 556 breakfast meals (or plates) at 85 sites, 989 lunch meals at 161 sites, and 75 suppers meals at 12 sites. Plate waste analyses are discussed in Section C of this chapter.

1. Most Frequently Served Foods

Analysis of what foods the SFSP serves frequently provides insight into SFSP meal planning practices and background for interpreting the nutrient data discussed in Section B.4 of this chapter. Tables V.5 and V.6 list the foods that were observed on at least 5 percent of plates at breakfast and lunch, respectively. After the observed foods were coded, the codes were grouped into one of the following food categories: milk, dairy (other than milk), fruit, vegetable, bread/bread alternate, meat/meat alternate (other than dairy), mixed dish, and other beverage.¹¹ (Appendix E provides additional details about how foods were categorized and analyzed for the food group analysis.) Because many of the foods at supper were observed at only one site, and only a small number of supper plates were observed, it is not possible to draw reliable conclusions about what foods were served most frequently at SFSP suppers. Therefore, foods served at supper are discussed only in general terms.

¹⁰The nutritionists used the Food Intake Analysis System[®] 3.99 (FIAS). The FIAS database includes the Survey Nutrient Data Base, developed by the USDA's Agricultural Research Service and used in the 1998 Continuing Survey of Food Intakes by Individuals. Appendix E provides additional details on nutrient coding.

¹¹Mixed dishes are dishes containing a meat/meat alternate, a bread/bread alternate, and/or a vegetable.

TABLE V.5

FOODS MOST COMMONLY SERVED AT BREAKFAST,
BY FOOD CATEGORY

Food Category	Number of Times Item Observed ^a	Mean Serving Size (Grams)	Standard Error		Percentage of All Plates Containing Food Item		Percentage of All Plates Containing Food Category		Standard Error
			(1.4)	(3.6)	31.8	28.8	96.6	(1.25)	
Milk	536								
2-percent white milk	170	246	(1.4)	(10.93)	31.8	(1.4)	96.6	(1.25)	
Whole white milk	155	250	(3.6)	(7.98)	28.8	(3.6)			
1-percent white milk	114	245	(1.3)	(4.48)	16.8	(1.3)			
1-percent chocolate milk	54	250	(0.0)	(6.21)	14.2	(0.0)			
Dairy ^b	69								
Yogurt	23	119	(6.1)	(5.61)	7.4	(6.1)	17.5	(6.92)	
Processed cheese	21	26	(1.4)	(4.30)	6.9	(1.4)			
Fruit	516								
Orange juice	191	134	(4.3)	(9.28)	39.8	(4.3)	86.7	(5.68)	
Apple juice	87	148	(15.8)	(7.16)	20.4	(15.8)			
100-percent fruit juice blend	40	128	(3.8)	(3.74)	8.1	(3.8)			
Nectarine	5	136	(0.0)	(5.40) ^c	5.6 ^c	(0.0)			
Applesauce, apples (cooked or canned)	46	109	(11.5)	(2.56)	5.3	(11.5)			
Vegetable	56								
Bread/Bread Alternate	728								
Cereal	294	27	(1.8)	(9.18)	54.8	(1.8)	93.8	(5.39)	
White bread	71	29	(1.2)	(5.38)	11.7	(1.2)			
Dark bread (whole wheat, rye, bran)	40	44	(7.9)	(7.58)	9.1	(7.9)			
Sweet roll, breakfast tart, coffee cake, funnel cake, churro	26	59	(13.0)	(5.87)	8.0	(13.0)			

TABLE V.5 (continued)

Food Category	Number of Times Item Observed (Unweighted) ^a	Mean Serving Size (Grams)	Standard Error	Percentage of All Plates Containing Food Item	Standard Error	Percentage of All Plates Containing Food Category	Standard Error
Doughnut	29	64	(4.7)	5.7	(3.21)		
Crackers (animal, graham)	18	18	(3.3)	5.1	(3.40)		
Meat/Meat Alternate ^d	169					14.0	(4.45)
Eggs	58	91	(15.4)	7.7	(3.26)		
Mixed Dish ^e	8					0.3	(0.24)
Other Beverage ^f	23					1.9	(1.32)
Sample Size^g	556	—	—	—	—	—	—

SOURCE: SFSP Implementation Study, Site Observations (2001).

NOTE: Tabulations are weighted to be representative of all breakfasts served nationally. Only those items served on 5 percent of plates or more are listed. Numbers may not agree with figures in Tables V.5 and V.6, on meal compliance, because items in the “Mixed Dish” category may contain food items from other food categories.

^aIf the same food item appeared on a plate more than once, it was counted only once (for example, if a plate had two containers of 1-percent chocolate milk). If two different food items from the same food category were observed on a plate, they were counted separately (for example, if a plate had one container of 1-percent chocolate milk and one container of 2-percent white milk). Thus, the number of items in a category may exceed the number of plates.

^bExcludes milk. Dairy foods are considered meat alternates.

^cEstimates may be unreliable due to the small sample size.

^dMeat/meat alternate is not a requirement for breakfast.

^eMay include combinations of meat, dairy, bread, and vegetable items. Items counted as part of mixed dishes are not counted in these separate categories.

^fOther beverages include soft drinks, iced tea, and fruit-juice drinks, which contain less than 100-percent fruit juice.

^gRepresents the total number of plates observed at breakfast at 85 sites.

TABLE V.6

FOODS MOST COMMONLY SERVED AT LUNCH,
BY FOOD CATEGORY

Food Category	Number of Times Item Observed (Unweighted) ^a	Mean Serving Size (Grams)	Standard Error	Percentage of All Plates Containing Food Item	Standard Error	Percentage of All Plates Containing Food Category	Standard Error
Milk	910					95.0	(1.49)
1-percent chocolate milk	322	252	(1.9)	37.2	(5.88)		
2-percent white milk	156	244	(0.8)	14.5	(4.36)		
Whole white milk	124	244	(0.0)	14.2	(2.87)		
2-percent chocolate milk	128	251	(1.1)	12.8	(5.25)		
1-percent white milk	95	244	(0.0)	9.3	(2.49)		
Skim chocolate milk	62	250	(0.0)	5.9	(3.49)		
Dairy ^b	344					28.3	(4.86)
Processed cheese	224	26	(1.9)	18.7	(4.21)		
Natural cheese	71	19	(3.5)	8.0	(3.08)		
Fruit	1,050					91.8	(2.07)
Peaches (cooked or canned)	110	101	(8.7)	13.4	(4.20)		
Apple juice	75	124	(0.0)	10.2	(3.39)		
Cantaloupe, honeydew, watermelon	83	177	(19.5)	10.0	(4.51)		
Orange (raw)	66	114	(9.2)	9.7	(4.02)		
Applesauce, apples (cooked or canned)	77	117	(6.1)	8.5	(2.45)		
Apple (raw)	108	132	(3.0)	8.2	(3.59)		
Banana (raw)	65	109	(4.1)	7.8	(3.37)		
100-percent fruit juice blend	47	128	(5.1)	7.7	(3.10)		
Pineapples (canned)	53	109	(8.6)	7.0	(2.66)		
Fruit cocktail	75	95	(9.9)	6.9	(2.81)		
Grape juice	49	164	(27.8)	5.9	(2.39)		
Pears (cooked or canned)	66	109	(8.0)	5.7	(2.09)		
Vegetable	949					60.9	(4.83)
French fries	148	56	(4.5)	10.3	(4.24)		
Carrots (raw)	76	48	(5.2)	9.6	(3.25)		
Corn	91	77	(6.0)	9.5	(3.30)		

TABLE V.6 (continued)

Food Category	Number of Times Item Observed (Unweighted) ^a	Mean Serving Size (Grams)	Standard Error	Percentage of All Plates Containing Food Item	Standard Error	Percentage of All Plates Containing Food Category	Standard Error
Lettuce (raw)	119	11	(2.3)	8.1	(2.46)		
Tomatoes (raw)	94	30	(6.0)	7.4	(2.35)		
Salad with assorted vegetables	65	34	(3.5)	5.7	(3.18)		
Pickles	53	46	(13.0)	5.7	(2.11)		
Bread/Bread Alternate	995					76.1	(5.88)
Rolls (white, egg, hoagie)	324	49	(2.8)	28.6	(4.57)		
White bread	155	44	(4.9)	20.7	(5.93)		
Dark bread (whole wheat, rye, bran)	97	47	(9.3)	11.8	(3.56)		
Crackers (animal, graham)	45	26	(3.0)	11.3	(3.95)		
Cookies	107	36	(5.5)	9.8	(2.65)		
Salty snacks	87	24	(2.5)	6.2	(2.94)		
Meat/Meat Alternate	705					61.1	(6.03)
Luncheon meat	170	45	(4.3)	18.6	(4.01)		
Bologna	75	35	(4.2)	8.6	(2.86)		
Peanut butter	44	75	(19.8)	6.3	(1.93)		
Ground beef	62	54	(7.2)	5.5	(2.22)		
Mixed Dish ^c	345					37.6	(6.15)
Pizza	110	95	(13.0)	15.7	(4.49)		
Other Beverage ^d	90					4.3	(1.83)
Sample Size^e	989						

SOURCE: SFSP Implementation Study, Site Observations (2001).

NOTE: Tabulations are weighted to be representative of all lunches served nationally. Only those items served on 5 percent of plates or more are listed. Numbers may not agree with figures in Tables V.5 and V.6, on meal compliance, because items in the “Mixed Dish” category may contain food items from other food categories.

^aIf the same food item appeared on a plate more than once, it was counted only once (for example, if a plate had two containers of 1-percent chocolate milk). If two different food items from the same food category were observed on a plate, they were counted separately (for example, if a plate had one container of 1-percent chocolate milk and one container of 2-percent white milk). Thus, the number of items in a category may exceed the number of plates.

TABLE V.6 (continued)

^bExcludes milk. Dairy foods are considered meat alternates.

^cMay include combinations of meat, dairy, bread, and vegetable items. Items counted as part of mixed dishes are not counted in these separate categories.

^dOther beverages include soft drinks, iced tea, and fruit-juice drinks, which contain less than 100-percent fruit juice.

^eRepresents the total number of plates observed at lunch at 161 sites.

a. Breakfast

A “typical” SFSP breakfast consisted of a ready-to-eat cereal, milk, and 100-percent fruit juice. Most breakfast sites provided a cold main item, such as cereal, rather than a hot entree (60 and 27 percent, respectively; not shown in Table V.5). At 13 percent of sites, however, children were given a choice between a hot or cold main entree. A small proportion of meals (18 percent) contained a dairy item other than milk, such as yogurt or processed cheese, which counts as a meat alternate; even smaller proportions contained a meat or nondairy meat alternate (14 percent) or a vegetable (6 percent). This observation is not surprising, as SFSP breakfasts are not required to provide a meat/meat alternate. Breakfasts fulfilled the fruit/vegetable requirement most often by serving 100-percent fruit juice.

Milk is reported in Tables V.5 and V.6 separately from other dairy products, which are served as meat alternates. Almost 97 percent of breakfast meals contained some type of milk. Slightly more than three-fourths of all breakfasts (77 percent) contained white milk. About 29 percent included whole milk, 32 percent included 2-percent or reduced fat milk, and 31 percent included 1-percent or low-fat milk. After milk, the most frequently served dairy items were yogurt and processed cheese. Cheese usually was served as part of a breakfast sandwich or breakfast burrito.

Almost 87 percent of breakfasts included a fruit or fruit juice, most often 100-percent fruit juice. Orange juice was the most commonly served juice, followed by apple juice and 100-percent fruit juice blends. Only about 6 percent of breakfasts included a vegetable. Vegetables served in breakfasts included red peppers, green peppers, and onions (not shown in Table V.5).

Cereal was the most common bread/bread alternate, followed first by white bread and then by dark bread (whole wheat, rye, or bran). About 8 percent of plates contained a breakfast-type pastry (sweet roll, tart, coffee cake, churro, or funnel cake), and 6 percent contained a doughnut.

Scrambled eggs were the most common item served in breakfast meals that included the optional meat or meat alternate at breakfast (14 percent of all breakfast plates). Fewer than 5 percent of breakfast meals contained such foods as sausage, bacon, beef steak, or pork patties.

Approximately 2 percent of breakfast meals contained beverages other than milk or fruit juice. These beverages usually were fruit-flavored drinks, such as fruit punch with less than 100-percent juice, which do not satisfy the fruit/vegetable requirement.

b. Lunch

Although more difficult to define than a typical breakfast, a “typical” lunch would contain milk, a sandwich or “mixed dish,” and a fruit and/or a vegetable (Table V.6). More lunch sites included cold main entrees than hot ones (54 and 43 percent, respectively); 3 percent included both hot and cold entrees. Hot entrees usually were mixed dishes, such as pizza, whereas cold entrees usually were sandwiches.

Ninety-five percent of lunches contained milk. Chocolate milk was served 56 percent of the time at lunch. Unlike at breakfast, 1-percent chocolate milk was the most common milk served; it was served 37 percent of the time, whereas 2-percent white milk and whole white milk each were served 14 percent of the time. Other milks served included 2-percent chocolate milk (13 percent of lunches), 1-percent white milk (9 percent of lunches), and skim chocolate milk (6 percent of lunches). Fewer than one-third of all lunches included a non-milk dairy item. Natural or processed cheese was the most commonly served dairy item other than milk.

More than 90 percent of the lunches included fruit. The most commonly served fruit was cooked or canned peaches (on 13 percent of plates). However, many other types of fruit were served almost as frequently as peaches. The interviewers observed each of the following fruits on about 8 to 10 percent of lunch plates: apple juice, melons, oranges, applesauce, apples, bananas, and fruit juice blend.

Vegetables may be represented in both the vegetable category and the mixed dish category. Table V.6 shows that 61 percent of lunches contained vegetables served as a single dish or item (that is, in the vegetable category, rather than in the mixed dish category). French fries, carrots, and corn were the most commonly served vegetables (each observed on about 10 percent of lunch meals).

A bread/bread alternate was observed in slightly more than three-quarters of all lunches. (Mixed dishes also could include bread/bread alternate items.) More than 60 percent of all lunches contained a roll or bread—the most commonly served foods in the bread/bread alternate category. Rolls and bread reflected the high percentage of sites that served sandwiches. White bread was more commonly served than was dark bread.

Meats or meat alternates (other than those included in mixed dishes) were served on 61 percent of plates. The most common ones—luncheon meat, bologna, and peanut butter—reflect the popularity of sandwiches. Ground beef was served on 6 percent of plates on its own (that is, not counting when it was served as part of a mixed dish).

Pizza, the most commonly served mixed dish, was observed in approximately 16 percent of lunches.¹² Other mixed dishes included corn dogs, hamburgers, cheeseburgers, beef barbecue sandwiches, soup, and nachos and cheese; however, each of these was observed on fewer than 5 percent of the lunch plates.

¹²Mixed dishes may contain one or more food components. The analysis in this section is based largely on categorization of foods as they are commonly eaten in SFSP meals, rather than by their components. For example, pizza is listed under the mixed dish category, rather than under one or more of the other food components (cheese pizza would contribute to the dairy, vegetable, and bread components; pepperoni pizza would also contribute to the meat component.) However, some mixed dishes were categorized into and coded as their components, so the data on mixed dishes underestimate the total mixed dishes. (See Appendix E for details.)

Some lunches contained fruit-flavored drinks and soft drinks, but neither of these “other” beverages count toward achieving the meal pattern. Fewer than 5 percent of lunches contained one of these beverages.

c. Supper

Because only 12 sites in the sample served supper, foods served at supper are described for qualitative purposes but are not shown in a data table (due to small sample sizes). Suppers provided a variety of foods, so no supper meal can be considered “typical.” All the main supper entrees the interviewers observed were hot items; very few main entrees were sandwiches. Nearly three-fourths (71 percent) of suppers contained a nondairy meat/meat alternate, usually a food other than luncheon meat. About one-fourth (24 percent) of suppers contained a mixed dish, such as chili con carne, spaghetti with sauce, chicken parmigiana, soup, or a calzone.¹³

Approximately two-thirds (67 percent) of all suppers contained milk. About 10 percent of the sites visited at supper were kosher sites, which may partly explain this low percentage. About one-fifth (21 percent) of suppers contained another dairy item, usually cheese. As at breakfast and lunch, the majority of suppers included a fruit and a bread/bread alternate (95 percent and 99 percent, respectively), and two-thirds (67 percent) included a vegetable, such as french fries or string beans.

2. Food Preferences of Participants

To help assess what can be done to make SFSP meals appealing to children, the interviewers asked site supervisors to indicate, on the basis of their perceptions, program participants’ most liked food and least liked food in each of five categories: (1) meat/meat alternate, (2) vegetable, (3) fruit, (4) bread/bread alternate, and (5) milk. The supervisors were instructed to report only one item in each category. When multiple responses were given, the first response was used in the analyses.

Supervisors at 18 percent of the sites reported that pizza was the children’s most liked meat/meat alternate (Table V.7). Pizza was also the mixed dish most frequently served at lunch. Ham was nearly as well liked as was pizza; almost 17 percent of site supervisors reported that ham was the children’s favorite meat/meat alternate. Other popular meat/meat alternates were chicken nuggets or chicken strips, hamburgers or cheeseburgers, and bologna. Bologna also was the meat/meat alternate most commonly reported to be the children’s least favorite, reported by 18 percent of site supervisors. However, bologna was the second most commonly served meat/meat alternate, appearing on almost 9 percent of plates. Children at some sites disliked tacos or other Mexican-type dishes, roast beef, fish (baked, fried), and tuna sandwiches or tuna casserole.

¹³The data in this paragraph should be interpreted with caution, as many of these foods were observed on only a few plates.

TABLE V.7

FOOD PREFERENCES OF PARTICIPANTS, REPORTED BY SITE SUPERVISORS

Food Liked Most	Percentage of Sites	Standard Error	Food Liked Least	Percentage of Sites	Standard Error
Meat/Meat Alternate			Meat/Meat Alternate		
Pizza	18	(3.7)	Bologna	18	(5.3)
Ham	17	(4.6)	Tacos, enchiladas, quesadillas, fajitas, nachos, burritos	12	(3.8)
Chicken nuggets, chicken strips	12	(3.1)	Roast beef	10	(4.4)
Hamburgers, cheeseburgers	9	(2.5)	Fish (baked, fried)	9	(3.2)
Bologna	7	(2.7)	Tuna sandwich or casserole	8	(2.8)
Vegetable			Vegetable		
Carrots	30	(7.0)	Peas	19	(5.3)
Corn	28	(5.3)	Carrots	15	(5.0)
Potatoes (French fries, potato puffs)	12	(3.0)	Celery	13	(4.3)
Salad (tossed, chef)	9	(3.7)	Green beans or string beans	11	(3.4)
Green beans, string beans	4	(2.0)	Broccoli	11	(3.6)
Fruit			Fruit		
Oranges	17	(4.6)	Apples or apple sauce	25	(5.3)
Peaches	17	(3.4)	Oranges	14	(4.4)
Apples or apple sauce	16	(4.2)	Pears	12	(3.3)
Mixed fruit cup	9	(2.7)	Bananas	10	(3.1)
Bananas	8	(3.0)	Mixed fruit cup	10	(3.2)
Bread/Bread Alternate			Bread/Bread Alternate		
White bread	54	(4.8)	Dark bread (rye, whole wheat)	37	(6.2)
Buns (hotdog, hamburger, hoagie)	13	(3.3)	White bread	22	(5.0)
Rolls (all types)	12	(2.7)	Rolls (all types)	18	(5.7)
Breadsticks	4	(1.5)	Buns (hotdog, hamburger, hoagie)	9	(3.0)
Dark bread (rye, whole wheat)	3	(2.3)	Corn bread	5	(1.9)

TABLE V.7 (continued)

Food Liked Most	Percentage of Sites	Standard Error	Food Liked Least	Percentage of Sites	Standard Error
Milk^a			Milk^a		
Chocolate	93	(3.0)	White	96	(1.9)
White	7	(3.0)	Chocolate	4	(1.9)
Sample Size	161	—		—	—

SOURCE: SFSP Implementation Study, Site Supervisor Interviews (2001).

NOTE: Tabulations are weighted to be representative of sites nationally. Except for milk, the five most frequently mentioned foods in each category are listed.

^aBecause many site supervisors did not specify the fat content of the milk (whole, 2 percent, 1 percent, or skim), data are reported only by flavor.

The most liked and least liked foods in each of the three other categories (vegetables, fruits, and bread/bread alternates) overlapped substantially. Possible explanations for this finding include different tastes and preferences of program participants in different areas of the country and lack of food variety within sites. Nearly equal percentages of site supervisors reported that corn and carrots were the most liked vegetable. Although corn does not appear on the “liked the least” list, carrots ranked as the second most disliked vegetable. Similarly, supervisors most frequently listed oranges, apples, fruit cup, and bananas as fruits that children “liked the most,” and as fruits they “liked the least,” albeit in a different rank order.

As in the national study by Ohls et al. (1988), children preferred various forms of white bread, including standard loaf white bread or hotdog, hamburger, or hoagie buns, to other breads/bread alternates. They liked dark bread (rye, whole wheat, or bran) the least. Likewise, the children’s preference for chocolate milk over white milk has withstood the test of time.

The data presented in Table V.7 are based on site supervisors’ reports of specific food likes and food dislikes. In some cases, however, the supervisors also gave such responses as “no other [food item] is served,” “no [food item] is served at all,” “the children haven’t had any other,” and “the children like none.” Site supervisors at 16 percent of the sites gave one of those responses, rather than reporting a least-liked vegetable. The comments represent 13 percent of responses about least-liked fruits and 8 percent of responses about least-liked bread/bread alternates. These relatively high percentages suggest that some sites offered only a limited variety of fruits, vegetables, and bread/bread alternates.

3. Nonschool Sponsors’ Compliance with SFSP Meal Pattern

All SFSP sponsors must meet USDA menu planning requirements. The menu planning requirements for the SFSP program are designed to provide nutritious, well-balanced meals to each child. Sponsors other than SFAs must serve meals that follow the SFSP meal pattern. Each meal has specific requirements for both the types of food served and serving sizes. Under the SFSP meal pattern, breakfasts must include three components: (1) milk, (2) bread or a bread alternate, and (3) fruit and/or a vegetable. Meat or a meat alternate is optional. The SFSP lunch/supper meal pattern requires four components: (1) milk, (2) bread or a bread alternate, (3) two fruits and/or vegetables, and (4) meat or a meat alternate. USDA also has regulations for the minimum serving sizes of each food component. Sponsors are encouraged by USDA to serve larger portions to children age 12 or older, as these children have greater food needs than do younger ones. In addition, sponsors may receive permission from their state agency to serve smaller portions to preschool children, using the Child and Adult Care Food Program (CACFP) meal pattern. (See Table E.2 for details on the SFSP meal pattern requirements.)

School sponsors may use either the SFSP meal pattern or the same menu planning approach they use for the school meal programs (7CFR 225.16, 7CFR 220.8, and 7CFR 210.10). There are two main approaches used in the school meal programs, and each has two variants:

1. ***Food-Based Menu Planning.*** Under the traditional food-based meal pattern, school sponsors must offer specific food components and food quantities based on age and grade groups. The enhanced approach uses the same meal pattern and age groups as does the traditional approach, but it has an additional optional age/grade group for grades 7 through 12.
2. ***Nutrient Standard Menu Planning.*** Nutrient standard menu planning is designed to meet the goal of providing one-fourth of the RDAs for key nutrients (energy, protein, vitamins A and C, calcium, and iron) at breakfast, and one-third of the RDAs for these key nutrients at lunch. Menus are planned using approved computer software so that these RDA standards are met, on average, over the course of a week. SFAs may do the menu planning themselves (NuMenus), or they may have it done by a third party (Assisted NuMenus).

SFAs also may use OVS in the SFSP, a system which is used in most schools for the school meal programs. Nonschool sponsors may not use OVS. Under OVS, a child may refuse one or more items that he or she does not intend to eat, but the meal still counts as a reimbursable meal. The rules for OVS differ slightly according to which menu planning approach is used. At sites at which OVS is used, the observations of foods selected by children do not necessarily reflect what was offered; thus, it is not possible to use these observations to assess whether meals being offered meet the menu planning requirements.

For both school and nonschool sponsors that use food-based meal patterns, a few exceptions apply. One exception applies to sponsors that request and obtain an exemption for religious reasons. For example, sponsors that adhere to kosher dietary laws may request a milk exemption for lunch and supper, replace the milk with juice, and serve milk at breakfast and, if possible, at snacks (U.S. Department of Agriculture 2002b).^{14,15} Other exceptions to the SFSP meal pattern include (1) state authorizations to serve smaller food quantities for sponsors that serve children younger than age 6, as noted; and (2) food substitutions for individuals with medical or special dietary needs (7CFR 225.16).

Because school sponsors may use any one of a number of methods to plan meals (food-based or nutrient standard menu planning), and because they may use OVS, meal pattern compliance

¹⁴Kosher dietary laws allow meat alternates, such as fish, cheese, eggs, nut and seed butter, and nuts and seeds, to be consumed with milk at the same meal.

¹⁵Fewer than 2 percent of the visited sites were kosher ones. Some sponsors of the kosher sites served peanut butter or dairy items for meat and thus were able to serve milk during lunch or supper. The analysis therefore includes kosher meals, with any findings on milk discussed with the kosher exception in mind.

could be assessed only for nonschool-sponsored meals.¹⁶ Tables V.8 and V.9 show the percentage of meals containing the required components in the minimum serving sizes, as defined by SFSP regulations, for nonschool sponsors at breakfast and lunch, respectively. The tables also show, for each component, the percentage of meals meeting the minimum serving size, the percentage of meals falling short of the required serving size, and the percentage of meals missing a component altogether. A similar data table for school-sponsored meals is provided for descriptive purposes to describe the food components typically served at breakfasts and lunches by SFAs and their amounts relative to meal pattern standards (Appendix Table F.3); however, these data should not be interpreted as reflecting compliance with regulations. Sites sponsored by SFAs may have been using the OVS option. Appendix Table F.4 presents data on food components served separately for OVS and non-OVS sites, based on the sponsors' reports of the use of OVS at any of their sites.¹⁷

a. Nonschool Sponsors' Meal Pattern Compliance at Breakfast

About 55 percent of breakfasts at nonschool-sponsored sites complied with all SFSP meal pattern requirements for both the type and quantity of required foods. About half of all noncompliant breakfasts had an inadequate serving size for the fruit/vegetable component (Table V.8). Of the required components, the milk and bread/bread alternate requirements were met most often, followed by the fruit/vegetable component. Ninety-three percent of nonschool sponsors' breakfasts met the milk requirement, 84 percent met the bread/bread alternate requirement, and 73 percent met the fruit/vegetable requirement.¹⁸

SFSP meal pattern regulations require that each program participant receive 8 fluid ounces of milk at each meal served. This amount is equivalent to a one-half pint carton, which was the way that most milk was served. Milk served at breakfast usually was a beverage or was poured over cereal. Interviewers observed that 93 percent of breakfasts at nonschool sites contained at least 8 fluid ounces of milk (Table V.8). (Fewer than 1 percent of breakfasts served milk in insufficient amounts.) Approximately 6 percent of breakfast meals at nonschool sites had no milk.

¹⁶Data on menu planning methods used by school-sponsored sites were not collected in this study. Furthermore, use of OVS was assessed only at the sponsor level.

¹⁷It was difficult to determine solely on the basis of observations whether sites were in fact using OVS. Furthermore, many site staff were unfamiliar with the term and therefore could not reliably report whether they used OVS. The definition for OVS is based on the school sponsor's report that OVS was used at one or more of its sites.

¹⁸To determine the extent of variability in meal compliance within sites, we also assessed whether all, some, or none of the meals met all the required food components. All sampled breakfast meals served by nonschool sponsors met all the requirements at 38 percent of sites, some meals met all the requirements at 38 percent of sites, and no meals met all the requirements at 24 percent of sites (based on weighted tabulations of data for 31 sites).

TABLE V.8
MEAL COMPLIANCE AT BREAKFAST FOR NONSCHOOL SPONSORS
(Percentage of Breakfasts Observed)

	Component Present in Required Amounts ^a	Standard Error	Component Present, Not in Required Amounts ^a	Standard Error	Component Not Present	Standard Error
All Required Components	54.6	(11.43)	n.a.	n.a.	n.a.	n.a.
Milk requirement	93.4	(2.42)	0.8	(0.70)	5.8	(2.56)
Fruit and/or vegetable requirement	73.4	(8.55)	21.8	(8.20)	4.8	(2.53)
Bread/bread alternate requirement	83.8	(12.24)	1.9	(1.90)	14.4	(12.25)
Meat/meat alternate option ^b	30.7	(12.67)	n.a.	n.a.	69.3	(12.67)
Sample Size^c	187	—	—	—	—	—

SOURCE: SFSP Implementation Study, Site Observations (2001).

NOTE: Tabulations are weighted to be representative of meals served nationally.

^aAs defined by SFSP meal pattern guidelines.

^bAt breakfast, the meat/meat alternate component is optional. This table reflects whether a meat or a meat alternate component was present, but not whether it was present in the suggested amount.

^cTotal number of meals observed at breakfast at 31 sites.

n.a. = not applicable.

TABLE V.9
MEAL COMPLIANCE AT LUNCH FOR NONSCHOOL SPONSORS
(Percentage of Lunches Observed)

	Component Present in Required Amounts ^a	Standard Error	Component Present, Not in Required Amounts ^a	Standard Error	Component Not Present	Standard Error
All Required Components	70.6	(7.33)	n.a.	n.a.	n.a.	n.a.
Milk requirement ^b	96.9	(1.61)	0.1	(0.07)	3.1	(1.61)
Fruit and/or vegetable requirement	96.2	(2.78)	3.7	(2.76)	0.1	(0.09)
Bread/bread alternate requirement	95.8	(1.90)	3.9	(1.88)	0.3	(0.25)
Meat/meat alternate requirement	79.9	(5.82)	20.1	(5.81)	0.1	(0.01)
Sample Size^c	449	—	—	—	—	—

SOURCE: SFSP Implementation Study, Site Observations (2001).

NOTE: Tabulations are weighted to be representative of meals served nationally.

^aAs defined by SFSP meal pattern guidelines.

^bIncludes kosher meals, where sites may have been exempt from serving milk. Fewer than 1 percent of nonschool sites and fewer than 2 percent of school sites visited at lunch were considered kosher sites, where a milk exemption was likely.

^cTotal number of meals observed at lunch at 83 sites.

n.a. = not applicable.

To meet the bread/bread alternate requirement, an SFSP breakfast must contain one serving¹⁹ of the following: one slice of bread; 1 ounce of dry cereal; one-half cup cooked cereal; one serving of a roll, muffin, or biscuit; or one-half cup cooked pasta. About 84 percent of the breakfasts at nonschool sites satisfied the bread or bread alternate component. Approximately 14 percent of nonschool breakfasts did not contain any bread or a bread alternate.

To meet the fruit/vegetable requirement, an SFSP breakfast must contain any of the following: a minimum of one-half of a cup of fruits and/or vegetables or 4 fluid ounces of full-strength fruit or vegetable juice. Seventy-three percent of breakfasts observed at nonschool-sponsored sites contained a fruit and/or vegetable in the minimum serving size; 22 percent contained the component, but in inadequate amounts. About 5 percent of breakfasts at nonschool sites did not contain any fruit or vegetable. At these breakfast meals, a fruit-juice drink that was less than 100-percent fruit juice sometimes was served instead.²⁰

Although the meat/meat alternate component is optional at breakfast, about 30 percent of breakfast meals at nonschool-sponsored sites included it as part of the meal.²¹ Typical meats served at breakfast were sausage or bacon; the most typical meat alternates were scrambled eggs, yogurt, and processed cheese.

b. Nonschool Sponsors' Meal Pattern Compliance at Lunch

Lunch has four required components and, in some cases, the components' serving size requirements are higher than at breakfast.²² Seventy-one percent of lunches served by nonschool sponsors met or exceeded the minimum serving sizes of all the required components (Table V.9).²³ Meal compliance at lunch was thus higher than at breakfast for nonschool-sponsored sites. The most frequent cause of noncompliance was an inadequate portion size for

¹⁹SFAs using food-based menu planning may serve (1) two servings of a meat or meat alternate; or (2) one serving of a bread or bread alternate, and one serving of a meat or meat alternate at breakfast.

²⁰In general, juice drinks contain between 10-percent and 99-percent juice and added sweeteners, flavors, and, sometimes, fortifiers, such as vitamin C or calcium.

²¹USDA has established guidelines for the minimum serving sizes of meat/meat alternates; however, because that component is optional, Tables V.8 and V.9 show only whether plates contained the component.

²²SFSP meal requirements for supper are the same as those for lunch. Due to small sample sizes (50 suppers observed at nonschool sites), the study does not report meal pattern findings at supper.

²³All sampled lunch meals met all the requirements at 65 percent of nonschool sites, some meals met all the requirements at 10 percent, and no meals met all the requirements at 24 percent. (Figures do not add to 100 due to rounding.)

the meat/meat alternate component. Data from the previous national study indicate that 94 percent of lunch plates contained all the required components, but the adequacy of quantities was not assessed (Ohls et al. 1988).²⁴

Milk usually was served as a beverage at lunch. Because milk almost always was served in a carton, milk service usually was an “all or none” situation (that is, when it was served, it was served in an adequate amount). About 97 percent of all lunches served at nonschool sites contained at least 8 fluid ounces of milk. Fewer than 1 percent of nonschool lunches included milk in insufficient amounts to meet the minimum requirement. Taken together, about 97 percent of lunches included milk, which is similar to the 98 percent observed by Ohls et al. (1988). The fact that 3 percent of the lunches at nonschool sites did not contain milk might partly reflect the observation of sites serving meat in kosher meals.²⁵ Ohls et al. did not visit residential camps for the 1986 study, and camps are the source of most kosher meals.

Lunch must provide at least two kinds of vegetables or fruits, or a combination of both. The minimum quantity required—three-quarters of a cup—is larger than the breakfast requirement. Full-strength vegetable or fruit juice may be counted to meet no more than one-half of this requirement. Interviewers observed an array of fresh and canned fruits and vegetables and fruit juice at lunch. About 96 percent of the lunches at nonschool sites complied with the fruit/vegetable requirement. The remaining 4 percent of lunches contained at least some fruit and/or vegetable, although not in the required amounts. Together, fruits or vegetables were present in nearly 100 percent of lunches at nonschool sites, a slightly higher proportion than the 95 percent reported by Ohls et al. (1988).

The bread/bread alternate requirement at lunch is identical to that at breakfast. Many lunches that the interviewers observed contained a sandwich, and the sandwich’s bread, roll, or bun therefore fulfilled the bread/bread alternate requirement. Such bread alternates as pizza crust, crackers, and pasta also can meet the requirement. Roughly 96 percent of lunches at nonschool sites complied with the bread or bread alternate requirement. An additional 4 percent came close but did not provide the minimum serving size.

Unlike at breakfast, the meat/meat alternate component is required at lunch for sponsors following the SFSP meal pattern. The nonschool-sponsored lunches met the requirement by including such items as pizza with meat, cheese pizza, chicken nuggets, hamburgers, hot dogs, or luncheon meat in sandwiches. Peanut butter, yogurt, nuts, cheese, and similar foods also are included in this category. Approximately 80 percent of lunches at nonschool sites met the minimum serving requirements for the meat/meat alternate component. Most of the remaining lunches contained at least some meat or meat alternate component, but not in the required minimum amount. The interviewers observed serving sizes of meat or a meat alternate ranging from 1.2 to 1.9 ounces, whereas USDA requires that at least 2.0 ounces be served.

²⁴The study by Ohls et al. examined all types of sites, as all sponsors were using the SFSP meal pattern at that time.

²⁵For lunch meals, 1 percent of nonschool sites were kosher.

The discrepancy in serving sizes for meats or meat alternates suggests that some food preparation or food service staff were not aware of the minimum serving requirements, or that they did not know how much to serve to meet the requirement. Other discrepancies could have been due to measurement error by cooks or to shrinkage during cooking. In addition, the results for lunch meat/meat alternate compliance should be interpreted with caution. Interviewers were trained to record and visualize amounts for all ingredients for mixed dishes, such as pizza (for example, with cheese, extra cheese, or pepperoni) and burritos (with or without meat or cheese). In these cases, the closest Food Intake Analysis System (FIAS) recipe was coded; the amount of meat or cheese in a FIAS recipe could differ from the actual amount contained in the recipe or food item served at an SFSP meal.

4. Nutrient Content of Meals Served

Although SFSP menu planning approaches are not always explicitly based on nutrient levels, all the approaches to menu planning described in Section B.3 are intended to meet children's daily needs, which are based on the RDAs for energy and nutrients. The RDA is the average daily nutrient intake level sufficient to meet the nutrient requirements of nearly all healthy individuals in a particular life stage and gender group (Institute of Medicine, National Academy of Sciences 2000a).²⁶

The SFSP nutrient analyses in this section are presented as follows:

- Means and 1-day distributions of energy and key nutrients compared with the RDA and other nutrition standards. Key nutrients are those included in the School Breakfast Program (SBP) and the National School Lunch Program (NSLP) regulations.
- Means and 1-day distributions for other nutrients compared with the RDA
- Means for energy and key nutrients compared with recent findings for school breakfasts and school lunches

These comparisons determine how well SFSP meals served met the RDA or other nutrition standards for most children participating in the program in 2001. In each analysis, data are presented for breakfast, lunch, and supper consecutively. Separate analyses for school- and nonschool-sponsored meals are shown in Appendix F and are discussed briefly in the following sections.

²⁶Beginning in 1997, the Institute of Medicine gradually has been releasing updated RDAs for specific nutrients based on the DRIs. The DRIs include nutrient standards for RDAs and for AIs, to be used when the available scientific evidence is insufficient to establish an RDA. In this study, the AI was used as the nutrition standard for calcium, as an RDA is not available.

a. Key Nutrients in SFSP Meals

School meals are expected to provide one-fourth of the RDA at breakfast and one-third of the RDA at lunch for key nutrients. Key nutrients in the SBP and NSLP regulations are energy, protein, vitamin A, vitamin C, calcium, and iron. In this analysis, standards similar to those applied in the school meals programs were used to assess the percentage of the RDA provided by SFSP breakfasts and lunches served.^{27,28}

On average over a week, school meals also must meet the following dietary guidelines: provide 30 percent of calories or less from total fat, provide less than 10 percent of calories from saturated fat, reduce sodium and cholesterol levels, and increase the level of dietary fiber (7CFR 210.10 and 7CFR 220.8). Again, this study's goal was to use similar standards to assess SFSP meals. Because the last two guidelines do not include quantitative standards, the following standards were used to assess SFSP meals:

- The National Research Council's recommendations in *Diet and Health* for sodium (600 mg or less at breakfast and 800 mg or less at lunch and supper) and for cholesterol (75 mg or less at breakfast and 100 mg or less at lunch and supper) (National Academy of Sciences, National Research Council 1989b)
- The American Health Foundation's recommendations for fiber (Williams 1995)²⁹

To provide a complete view of macronutrients (protein, fat, and carbohydrate), the data tables also present the percentage of calories from carbohydrate. School meal regulations do not specify a carbohydrate standard, but carbohydrate content is related to the recommended dietary guideline to "choose a diet with plenty of grain products, fruits, and vegetables" (7CFR 210.10 and 7CFR 220.8). The National Research Council's recommendation for the percentage of calories from carbohydrate (more than 55 percent) was used as the nutrition standard (National Academy of Sciences, National Research Council 1989b).

²⁷The school meal regulations are based on the 1989 RDAs and the 1990 Dietary Guidelines (7CFR 210.10 and 7CFR 220.8). This study used the updated DRI RDAs for iron and vitamins A and C and the AI for calcium in order to provide the most scientifically up-to-date assessment possible of the nutritional quality of SFSP meals (Institute of Medicine 1997, 2001, and 2000b).

²⁸To evaluate whether SFSP meals met the RDA standard, the mean energy and key nutrient content of meals served were compared with the RDA standard for the two age groups that most closely correspond to the age range of most children in the SFSP (4 to 8 years and 9 to 13 years).

²⁹The daily standard for grams of fiber is "age plus 5." To calculate the standard used in this study, this number was multiplied by one-fourth for breakfast and by one-third for lunch or supper. For example, the daily standard for an 8-year-old child is $8 + 5 = 13$ grams, corresponding to standards of 3.25 grams for breakfast and 4.3 grams for lunch or supper.

This analysis begins by comparing the mean energy and key nutrient content of SFSP meals served with the most up-to-date RDA standard available. A comparison of the mean nutrient value relative to the RDA standard is useful for assessing the meals served overall. To provide additional information for interpreting the overall pattern of energy and nutrients served across SFSP sites, the analysis then presents the distributions of key nutrients in SFSP meals.^{30,31} The distributions may be useful in planning SFSP menus, and in assessing the variability of SFSP meals across the program; note, however, that they are based on only a single day's observation per site. Because sites serve a variety of foods over time, the distribution of nutrients served over time is likely to be less dispersed than is the distribution for a single day. Meals that are low in one nutrient on one day may be balanced by meals that are high in that nutrient on other days.

Breakfasts. SFSP breakfasts provided close to the standard (one-fourth of the RDA) for energy, and exceeded the standard for key nutrients (Table V.10). The breakfasts provided an average of 424 calories, or 21 percent of the RDA for energy and 54 percent of the RDA for protein. They provided both the younger age group and the older age group with more than one-fourth of the RDA for key nutrients. The mean vitamin C content of the breakfasts corresponds to 152 percent of the RDA for children aged 4 to 8 years, and to 84 percent of the RDA for children aged 9 to 13 years. The mean iron intake corresponds to 42 percent and 53 percent of the RDA for younger children and older children, respectively. These two findings are important because the bioavailability of iron is increased if a food containing iron is served with a vitamin C source, and because the iron status of low-income children is an important health issue (U.S. Department of Health and Human Services 2000).

The nutrient patterns of SFSP breakfasts reflect the fact that many of the observed meals consisted of ready-to-eat cereals, milk, and juice. These foods provided children with both key nutrients and energy: fortified cereals and grains contributed iron; milk contributed protein and calcium; and 100-percent fruit juice contributed vitamin C.

On average, as shown in Table V.11, SFSP breakfasts met the standards for both age groups for the percentage of calories from total fat (mean of 25 percent) and the percentage of calories from carbohydrate (mean of 61 percent). The percentage of calories from saturated fat (mean of 11 percent) did not meet current dietary recommendations to reduce saturated fat to less than 10 percent of calories. Food sources of saturated fat at breakfast included breakfast sandwiches; meats, such as bacon and sausage; and whole and 2-percent milk.

³⁰For ease of presentation, the mean, the nutrition standard, and the distribution of nutrients related to the dietary standards are shown in the same data table.

³¹Tables of distributions of energy and nutrients include the values for the 10th, 25th, 50th, 75th, and 90th percentiles of meal plates observed on a single day at SFSP sites. If the value of the nutrition standard approximates the median, or 50th percentile, then, on any given day, 50 percent of the meals fall below the standard and 50 percent fall at or above the standard.

TABLE V.10

MEAN ENERGY AND KEY NUTRIENTS SERVED AT SFSP BREAKFASTS
AND COMPARISON WITH RDAs^a

	Mean	Standard Error	Mean as Percentage of Total RDA for 4 to 8 Year Olds	Mean as Percentage of Total RDA for 9 to 13 Year Olds
Macronutrients				
Energy (kcal)	424	(28.3)	21 ^b	21 ^b
Protein (g)	15.2	(1.02)	54 ^b	54 ^b
Vitamins and Minerals				
Vitamin A (RE)	328	(26.8)	82 ^c	55 ^c
Vitamin C (mg)	38	(5.0)	152	84
Calcium (mg)	378	(13.1)	47 ^d	29 ^d
Iron (mg)	4.2	(0.40)	42	53
Sample Size^e	556	—	—	—

SOURCE: SFSP Implementation Study, Site Observations (2001).

NOTE: Tabulations are weighted to be representative of breakfast meals served nationally.

^aSchool meal regulations are based on the 1989 RDAs and 1990 Dietary Guidelines. For purposes of this study, the updated Dietary Reference Intake RDAs for iron, vitamin A, and vitamin C and the Adequate Intake (AI) for calcium were used. The AI is used as the recommended standard for calcium because an RDA is not available.

^bValue represents the comparison of the mean relative to the 1989 RDA for children aged 7 to 10 years.

^cValue represents the upper bound, as the mean is expressed as Retinol Equivalents (REs), and the RDA is expressed as Retinol Activity Equivalents. See Appendix E for a detailed discussion.

^dValues represents the percentage of the AI.

^eTotal number of breakfasts observed at 85 sites.

RDA = Recommended Dietary Allowance.

TABLE V.11
 MEAN AND DISTRIBUTION OF ENERGY AND KEY NUTRIENTS
 SERVED ON A SINGLE DAY AT BREAKFAST

	Mean	SE	Nutrition Standard ^a					Percentile			
			4 to 8 Years		9 to 13 Years			25th	50th	75th	90th
Energy (kcal)	424	(28.3)	500 ^b	500 ^b	500 ^b	251	286	407	507	600	
Protein (g)	15.2	(1.02)	7 ^b	7 ^b	7 ^b	9.6	10.3	13.2	16.4	25.4	
Total Fat (% kcal)	25.1	(1.55)	≤30	≤30	≤30	13.5	18.7	23.0	32.0	39.1	
Saturated Fat (% kcal)	10.9	(0.40)	<10	<10	<10	5.3	8.6	10.8	13.4	15.7	
Carbohydrate (% kcal)	60.7	(1.56)	>55	>55	>55	45.4	54.0	62.9	67.2	74.0	
Vitamin A (RE)	328	(26.8)	100	100	150	142	206	307	391	580	
Vitamin C (mg)	38	(5.0)	6.25	6.25	11.25	5	12	40	53	77	
Calcium (mg)	378	(13.1)	200 ^c	200 ^c	325 ^c	307	324	346	440	502	
Iron (mg)	4.2	(0.40)	2.5	2.5	2.0	1.6	1.9	3.8	5.8	7.9	
Sodium (mg)	537	(59.3)	≤600	≤600	≤600	211	281	412	729	1,054	
Cholesterol (mg)	53	(8.8)	≤75	≤75	≤75	14	18	29	44	96	
Dietary Fiber (g)	2.4	(0.30)	2-3	2-3	3.5-4.5	0.7	1.3	2.0	3.0	4.1	

SOURCE: SFSP Implementation Study, Site Observations (2001).

NOTE: Tabulations are weighted to be representative of breakfasts served nationally. Based on 556 plates observed at 85 sites.

^aOne-fourth of the Recommended Dietary Allowance (RDA) for energy and nutrients; Dietary Guidelines for fat and saturated fat densities; National Research Council recommendation for carbohydrate density, sodium, and cholesterol; and American Health Foundation for fiber. School meal regulations are based on the 1989 RDAs and 1990 Dietary Guidelines. For purposes of this study, we used the updated Dietary Reference Intake RDAs for iron, vitamin A, and vitamin C, and the Adequate Intake (AI) for calcium. The AI is used as the recommended standard for calcium because an RDA is not available.

^bValue represents one-fourth the 1989 RDA for children aged 7 to 10 years.

^cValue represents one-fourth of the AI.

SE = standard error.

On average, breakfasts met the standard for cholesterol (mean of 53 mg) for younger and older ages, but not the standard for dietary fiber for the older age group. Fiber content (mean, 2.4 grams) met the recommendations only for the younger age group. Fiber sources included breakfast cereals, other grain products, and fruit. The mean sodium content (537 mg) met the standard of providing 600 mg of sodium or less. Breakfast foods containing high levels of sodium (and saturated fat) included prepackaged breakfast sandwiches and meats, such as bacon and sausage.

In general, the nutrition standards for energy and for many of the nutrients analyzed were close to the median for breakfast meals (Table V.11). A high percentage of meals met the standard for some key nutrients, such as protein and vitamin C. For example, the protein standard for breakfast is 7 grams, which falls below the 10th percentile, indicating that more than 90 percent of breakfasts met the protein standard (based on 1-day observations at each site). More than 90 percent of breakfasts met the calcium standard for children aged 4 to 8 years, and 75 percent met the standard for those aged 9 to 13 years. This finding on calcium is consistent with the milk findings reported previously in this chapter. However, more than half of all breakfasts did not meet the saturated fat standard of less than 10 percent of calories. In addition, more than half did not meet the standard for dietary fiber.

School- and Nonschool-Sponsored Breakfasts. Because school sponsors can use food-based menu planning or nutrient standard menu planning and can use OVS, this study compares, for school- and nonschool-sponsored sites, the mean energy and key nutrients at breakfast relative to the RDAs. The comparison, presented in Table F.5 in Appendix F, shows that nutrient patterns generally were similar for school- and nonschool-sponsored breakfasts. Mean energy at breakfast was below the RDA standard of 25 percent for energy for both groups (21 percent of the RDA for school-sponsored breakfasts, and 22 percent for nonschool-sponsored ones). Tables F.6 and F.7 show the means and distributions of energy, the key nutrients cited in school meal regulations, and other nutrients. On average, both school sponsors and nonschool sponsors served breakfasts that met the standard for the percentage of calories from total fat; however, nonschool-sponsored sites served a higher proportion of breakfasts that met the standard for 30 percent of calories or less from total fat than did school-sponsored sites (more than half compared with fewer than one-fourth of all breakfasts).

Vended Breakfasts. A comparison of the mean nutrients in vended and nonvended breakfasts showed that vended breakfasts provided an average of 359 calories, 18 percent of calories from total fat, 9 percent calories from saturated fat, and 286 mg of sodium, and that nonvended breakfasts provided 440 calories, 27 percent of calories from total fat, 11 percent of calories from saturated fat, and 597 mg of sodium (Table F.8; sample sizes are 98 vended meals and 458 nonvended meals). The profiles for saturated fat and sodium are significantly closer to the guidelines in vended breakfasts than in nonvended ones. Vended and nonvended breakfasts both fell short of the energy standard. Vended breakfasts provided 18 percent of the RDA for energy, and nonvended breakfasts provided 22 percent; the difference was not statistically significant.

Lunches. SFSP lunches provided an average of 663 calories, or 33 percent of the RDA for energy (Table V.12). Means for key nutrients exceeded the RDA standard for younger and older children. Lunches provided an average of 108 percent of the RDA for vitamin C for children

TABLE V.12

MEAN ENERGY AND KEY NUTRIENTS SERVED AT SFSP LUNCHES
AND COMPARISON WITH RDAs^a

	Mean	Standard Error	Mean as Percentage of Total RDA for 4 to 8 Year Olds	Mean as Percentage of Total RDA for 9 to 13 Year Olds
Macronutrients				
Energy (kcal)	663	(15.5)	33 ^b	33 ^b
Protein (g)	26.5	(0.74)	95 ^b	95 ^b
Vitamins and Minerals				
Vitamin A (RE)	379	(55.3)	95 ^c	63 ^c
Vitamin C (mg)	27	(2.8)	108	60
Calcium (mg)	448	(11.8)	56 ^d	34 ^d
Iron (mg)	4.0	(0.12)	40	50
Sample Size^e	989	—	—	—

SOURCE: SFSP Implementation Study, Site Observations (2001).

NOTE: Tabulations are weighted to be representative of lunch meals served nationally.

^aSchool meal regulations are based on the 1989 RDAs and 1990 Dietary Guidelines. For purposes of this study, the updated Dietary Reference Intake RDAs for iron, vitamin A, and vitamin C and the Adequate Intake (AI) for calcium were used. The AI is used as the recommended standard for calcium because an RDA is not available.

^bValue represents the comparison of the mean relative to the 1989 RDA for children aged 7 to 10 years.

^cValue represents the upper bound, as the mean is expressed as Retinol Equivalents (REs), and the RDA is expressed as Retinol Activity Equivalents. See Appendix E for a detailed discussion.

^dValues represents the percentage of the AI.

^eTotal number of lunches observed at 161 sites.

RDA = Recommended Dietary Allowance.

aged 4 to 8 years. Given that more than 90 percent of lunch plates included fruit, it is not surprising that the vitamin C contributions are high. For example, a single orange would provide both age groups with more than 100 percent of the RDA for vitamin C. Fortified breads and rolls provided significant amounts of iron, and milk and dairy products helped the lunches meet the AI standard for calcium for children in both age groups.

Table V.13 provides the means and distributions for energy, key nutrients, and nutrients related to the dietary guidelines for a single day at lunch. More than 90 percent of lunches met the protein and vitamin C standards. More than 90 percent met the calcium standard for children aged 4 to 8 years, and about half met the standard for children aged 9 to 13 years.

On average, SFSP lunches did not meet the standards for the percentage of calories from total fat or saturated fat. Lunches provided a mean of 32 percent of calories from total fat, and a mean of 12 percent of calories from saturated fat. About half the lunches met the standards for energy and the percentage of calories from total fat; however, fewer than half met the standard for the percentage of calories from saturated fat. Sources of fat and saturated fat at lunch included luncheon meats, hamburgers, pizza, cheeses, whole milk, and 2-percent milk.

On average, SFSP lunches met the dietary cholesterol and fiber standards for both age groups, but not the standards for the percentage of calories from carbohydrate (a mean of 52 percent of calories from carbohydrate). The mean sodium content (1,147 mg) was much higher than the recommended 800 mg or less of sodium at lunch.

School- and Nonschool-Sponsored Lunches. Comparisons of the lunch meals provided by school and nonschool sponsors are found in Tables F.9, F.10, and F.11. Both school- and nonschool-sponsored lunches met the RDA standards for energy and for key nutrients (Table F.9). The lunches had similar distributions for energy and key nutrients (Table F.10 and Table F.11 for school and nonschool sponsors, respectively). About half the lunches served by both school sponsors and nonschool sponsors did not meet the energy standard, and about one-fourth did not meet the saturated fat standard.

Vended Lunches. A comparison of vended lunches (289 plates) and nonvended lunches (700 plates) showed that they had similar mean energy and nutrient profiles. Thus, separate data tables are not shown for vended and nonvended lunches.

Supper. SFSP suppers provided an average of 783 calories, or 39 percent of the RDA for energy (Table V.14). The mean vitamin and mineral content of the foods exceeded the standard (one-third of the RDA) for all the key nutrients with the exception of calcium for the older age group (27 percent of its AI). It is likely that the finding on calcium reflects both a higher calcium standard for older children and beverage options in addition to or instead of milk in suppers provided by many residential camps in the sample. More than 75 percent of suppers met the RDA standard for energy. About 90 percent met the standards for protein, vitamins A and C, and iron.³²

³²Sample sizes for supper were too small to report findings broken down by school- and nonschool-sponsored suppers.

TABLE V.13

MEAN AND DISTRIBUTION OF ENERGY AND KEY NUTRIENTS SERVED ON A SINGLE DAY AT LUNCH

	Mean	SE	Nutrition Standard ^a		Percentile				
			4 to 8 Years	9 to 13 Years	10th	25th	50th	75th	90th
Energy (kcal)	663	(15.5)	667 ^b	667 ^b	467	546	648	749	856
Protein (g)	26.5	(0.74)	9 ^b	9 ^b	18.4	21.6	24.8	30.3	37.8
Total Fat (% kcal)	32.1	(0.65)	≤30	≤30	23.0	26.9	30.9	37.0	42.3
Saturated Fat (% kcal)	11.9	(0.40)	<10	<10	7.3	9.3	11.6	14.1	16.9
Carbohydrate (% kcal)	52.1	(0.74)	>55	>55	41.8	47.9	53.1	57.2	61.2
Vitamin A (RE)	379	(55.3)	133	200	134	169	224	307	1,003
Vitamin C (mg)	27	(2.8)	8	15	8	11	18	32	67
Calcium (mg)	448	(11.8)	267 ^c	433 ^c	343	369	436	517	598
Iron (mg)	4.0	(0.12)	3.3	2.7	2.5	3.2	3.7	4.8	5.4
Sodium (mg)	1,147	(55.5)	≤800	≤800	637	806	1,086	1,415	1,800
Cholesterol (mg)	57	(3.4)	≤100	≤100	22	37	50	73	95
Dietary Fiber (g)	5.5	(0.26)	3-4	4.5-6	2.8	4.0	5.1	6.8	8.6

SOURCE: SFSP Implementation Study, Site Observations (2001).

NOTE: Tabulations are weighted to be representative of lunches served nationally. Based on 989 plates observed at 161 sites.

^aOne-third of the Recommended Dietary Allowance (RDA) for energy and nutrients; Dietary Guidelines for fat and saturated fat densities; National Research Council recommendation for carbohydrate density, sodium, and cholesterol; and American Health Foundation for fiber. School meal regulations are based on the 1989 RDAs and 1990 Dietary Guidelines. For purposes of this study, we used the updated Dietary Reference Intake RDAs for iron and vitamins A and C and the Adequate Intake (AI) for calcium. The AI is used as the recommended standard for calcium because an RDA is not available.

^bValue represents one-third of the 1989 RDA for children aged 7 to 10 years.

^cValue represents one-third of the AI.

SE = standard error.

TABLE V.14

MEAN ENERGY AND KEY NUTRIENTS SERVED AT SFSP SUPPERS
AND COMPARISON WITH RDAs^a

	Mean	Standard Error	Mean as Percentage of Total RDA for 4 to 8 Year Olds	Mean as Percentage of Total RDA for 9 to 13 Year Olds
Macronutrients				
Energy (kcal)	783	(62.1)	39 ^b	39 ^b
Protein (g)	39.8	(4.63)	142 ^b	142 ^b
Vitamins and Minerals				
Vitamin A (RE)	500	(171.5)	125 ^c	83 ^c
Vitamin C (mg)	37	(12.8)	148	82
Calcium (mg)	357	(55.5)	45 ^d	27 ^d
Iron (mg)	5.1	(0.70)	51	64
Sample Size^e	75	—	—	—

SOURCE: SFSP Implementation Study, Site Observations (2001).

NOTE: Tabulations are weighted to be representative of supper meals served nationally.

^aSchool meal regulations are based on the 1989 RDAs and 1990 Dietary Guidelines. For purposes of this study, the updated Dietary Reference Intake RDAs for iron, vitamin A, and vitamin C and the Adequate Intake (AI) for calcium were used. The AI is used as the recommended standard for calcium because an RDA is not available.

^bValue represents the comparison of the mean relative to the 1989 RDA for children aged 7 to 10 years.

^cValue represents the upper bound, as the mean is expressed as Retinol Equivalents (REs), and the RDA is expressed as Retinol Activity Equivalents. See Appendix E for a detailed discussion.

^dValue represents the percentage of the AI.

^eTotal number of suppers observed at 12 sites.

RDA = Recommended Dietary Allowance.

Means at supper did not meet the standards for fat, saturated fat, sodium, or dietary cholesterol and were higher than respective lunch means (Table V.15). Suppers provided a mean of 37 percent of calories from total fat, 13 percent of calories from saturated fat, and 1,394 mg of sodium. As with lunch, a higher percentage of calories from fat corresponded to a lower percentage of calories from carbohydrate, with the result that suppers did not meet the standard for carbohydrate density. The single-day distributions show that more than three-fourths of the suppers did not meet the standard for the percentage of calories from total fat. In addition, more than 90 percent of suppers did not meet the standard for sodium. On average, suppers did meet the nutrition standard for fiber.

b. Other Nutrient Content of Meals Relative to the RDA Standards

The nutrient analysis in this study included a comparison of the content of SFSP meals relative to the RDAs for other nutrients not considered “key nutrients” under NSLP or SBP regulations. Although not mandated by USDA, the RDA standards are commonly used to assess the overall healthfulness of diets. Tables V.16, V.17, and V.18 show, for SFSP breakfasts, lunches, and suppers, respectively, the mean values for other vitamins and minerals relative to the RDAs. These nutrients include the B vitamins, vitamin E, phosphorus, magnesium, zinc, copper, potassium, and selenium. All the nutrients except potassium have established RDAs.

Breakfasts provided more than one-fourth of the RDA for all other vitamins and minerals shown with the exception of vitamin E. These meals provided 17 percent of the RDA for vitamin E for the younger age group, and 11 percent for the older age group. Lunches and suppers provided more than one-third of the RDA for all the nutrients shown with the exception of vitamin E for the older age group; vitamin E for that age group approached the standard (mean of 32 percent of the RDA). One-day distributions of these other vitamins and minerals are shown in Tables F.12, F.13, and F.14 for breakfast, lunch, and supper, respectively.

c. Comparison with School Meals

Key nutrient profiles for SFSP breakfasts and lunches were compared with those reported in the SNDA-II study for SBP and NSLP meals served during the 1998-1999 school year (Fox et al. 2001). Table V.19 compares the SFSP data and the SNDA-II results for elementary schools. In general, breakfast profiles are similar for energy, protein, vitamin C, calcium, and iron. On average, SFSP breakfasts and SBP breakfasts provided 21 percent and 23 percent of the RDA for energy, respectively; both were slightly below the RDA standard of 25 percent. SFSP breakfasts had a higher mean vitamin A content than did SBP breakfasts; the reverse is true for lunches. On average, both SFSP breakfasts and SBP breakfasts met the recommendations for cholesterol and sodium.

Nutrient profiles for SFSP lunches and school lunches are similar for energy and selected key nutrients. SFSP lunches provided 33 percent of the RDA for energy; NSLP lunches provided 35 percent. Notably, SFSP and NSLP lunches provided similar mean percentages of calories from fat (32 percent and 33 percent, respectively). Both types of lunches failed to meet

TABLE V.15
 MEAN AND DISTRIBUTION OF ENERGY AND KEY NUTRIENTS
 SERVED ON A SINGLE DAY AT SUPPER

	Mean	SE	Nutrition Standard ^a		Percentile				
			4 to 8 Years	9 to 13 Years	10th ^b	25th	50th	75th	90th ^b
Energy (kcal)	783	(62.1)	667 ^c	667 ^c	611	663	712	934	1,058
Protein (g)	39.8	(4.63)	9 ^c	9 ^c	26.3	31.1	34.7	42.9	61.2
Total Fat (% kcal)	36.8	(2.74)	≤30	≤30	27.4	31.2	37.1	43.5	46.0
Saturated Fat (% kcal)	12.8	(1.64)	<10	<10	7.3	8.7	13.7	16.7	17.1
Carbohydrate (% kcal)	43.2	(2.39)	>55	>55	35.2	36.9	41.7	49.3	53.3
Vitamin A (RE)	500	(171.5)	133	200	138	210	339	493	620
Vitamin C (mg)	37	(12.8)	8	15	6	16	22	47	120
Calcium (mg)	357	(55.5)	267 ^d	433 ^d	88	171	348	489	633
Iron (mg)	5.1	(0.70)	3.3	2.7	3.3	3.5	4.6	7.2	7.7
Sodium (mg)	1,394	(103.8)	≤800	≤800	969	1,073	1,283	1,686	1,828
Cholesterol (mg)	128	(17.1)	≤100	≤100	64	92	119	139	195
Dietary Fiber (g)	5.9	(1.02)	3-4	4.5-6	2.8	3.2	5.3	8.1	9.2

SOURCE: SFSP Implementation Study, Site Observations (2001).

NOTE: Tabulations are weighted to be representative of suppers served nationally. Based on 75 plates observed at 12 sites.

^aOne-third of the Recommended Dietary Allowance (RDA) for energy and nutrients; Dietary Guidelines for fat and saturated fat densities; National Research Council recommendation for carbohydrate density, sodium, and cholesterol; and American Health Foundation for fiber. School meal regulations are based on the 1989 RDAs and 1990 Dietary Guidelines. For purposes of this study, we used the updated Dietary Reference Intake RDAs for iron, vitamin A, and vitamin C, and the Adequate Intake (AI) for calcium. The AI is used as the recommended standard for calcium because an RDA is not available.

^bMay be unreliable due to small sample size.

^cValue represents one-third of the 1989 RDA for children aged 7 to 10 years.

^dValue represents one-third of the AI.

SE = standard error.

TABLE V.16

MEANS FOR OTHER NUTRIENTS SERVED AT SFSP BREAKFASTS AND
COMPARISON WITH RDAs^a

Vitamins and Minerals	Mean	Standard Error	Mean as Percentage of Total RDA for 4 to 8 Year Olds	Mean as Percentage of Total RDA for 9 to 13 Year Olds
B Vitamins				
Thiamin (mg)	0.47	(0.042)	78	52
Riboflavin (mg)	0.80	(0.042)	133	89
Niacin (mg)	4.18	(0.462)	52	35
Vitamin B ₆ (mg)	0.48	(0.044)	80	48
Folate (mcg)	100	(9.7)	50 ^b	33 ^b
Vitamin B ₁₂ (mcg)	1.26	(0.074)	105	70
Vitamin E (AE)	1.24	(0.173)	17	11
Phosphorus (mg)	376	(14.6)	75	30
Magnesium (mg)	68	(3.0)	52	28
Zinc (mg)	2.79	(0.177)	56	35
Copper (mg)	0.21	(0.022)	48	30
Potassium (mg)	729	(36.5)	n.a.	n.a.
Selenium (mcg)	19	(2.1)	63	48
Sample Size^c	556	—	—	—

SOURCE: SFSP Implementation Study, Site Observations (2001).

NOTE: Tabulations are weighted to be representative of breakfast plates served nationally.

^aFor the nutrients shown, the updated Dietary Reference Intake RDAs were used.

^bValue represents the lower bound, as the mean is expressed as mcg of total folate, and the RDA is expressed as mcg of Dietary Folate Equivalents. See Appendix E for a detailed discussion.

^cTotal number of breakfast plates observed at 85 sites.

n.a. = not applicable; RDA = Recommended Dietary Allowance.

TABLE V.17
 MEANS FOR OTHER NUTRIENTS SERVED AT SFSP LUNCHES
 AND COMPARISON WITH RDAs^a

Vitamins and Minerals	Mean	Standard Error	Mean as Percentage of Total RDA for 4 to 8 Year Olds	Mean as Percentage of Total RDA for 9 to 13 Year Olds
B Vitamins				
Thiamin (mg)	0.52	(0.021)	87	58
Riboflavin (mg)	0.77	(0.018)	128	86
Niacin (mg)	6.29	(0.302)	79	52
Vitamin B ₆ (mg)	0.50	(0.025)	83	50
Folate (mcg)	100	(3.7)	50 ^b	33 ^b
Vitamin B ₁₂ (mcg)	1.55	(0.057)	129	86
Vitamin E (AE)	2.80	(0.166)	40	25
Phosphorus (mg)	499	(13.2)	100	40
Magnesium (mg)	98	(3.0)	75	41
Zinc (mg)	3.23	(0.097)	65	40
Copper (mg)	0.39	(0.014)	89	56
Potassium (mg)	1,008	(23.9)	n.a.	n.a.
Selenium (mcg)	33	(1.6)	110	83
Sample Size^c	989	—	—	—

SOURCE: SFSP Implementation Study, Site Observations (2001).

NOTE: Tabulations are weighted to be representative of lunch plates served nationally.

^aFor the nutrients shown, the updated Dietary Reference Intake RDAs were used.

^bValue represents the lower bound, as the mean is expressed as mcg of total folate, and the RDA is expressed as mcg of Dietary Folate Equivalents. See Appendix E for a detailed discussion.

^cTotal number of lunch plates observed at 161 sites.

n.a. = not applicable; RDA = Recommended Dietary Allowance.

TABLE V.18
 MEANS FOR OTHER NUTRIENTS SERVED AT SFSP SUPPERS AND
 COMPARISON WITH RDAs^a

Vitamins and Minerals	Mean	Standard Error	Mean as Percentage of Total RDA for 4 to 8 Year Olds	Mean as Percentage of Total RDA for 9 to 13 Year Olds
B Vitamins				
Thiamin (mg)	0.51	(0.042)	85	57
Riboflavin (mg)	0.80	(0.017)	133	89
Niacin (mg)	10.53	(1.415)	132	88
Vitamin B ₆ (mg)	0.72	(0.083)	120	72
Folate (mcg)	117	(11.8)	59 ^b	39 ^b
Vitamin B ₁₂ (mcg)	1.63	(0.271)	136	91
Vitamin E (AE)	3.54	(0.344)	51	32
Phosphorus (mg)	535	(16.6)	107	43
Magnesium (mg)	101	(11.2)	78	42
Zinc (mg)	4.70	(0.651)	94	59
Copper (mg)	0.44	(0.074)	100	63
Potassium (mg)	1,115	(118.6)	n.a.	n.a.
Selenium (mcg)	45	(6.0)	150	113
Sample Size^c	75	—	—	—

SOURCE: SFSP Implementation Study, Site Observations (2001).

NOTE: Tabulations are weighted to be representative of supper plates served nationally.

^aFor the nutrients shown, the updated Dietary Reference Intake RDAs were used.

^bValue represents the lower bound, as the mean is expressed as mcg of total folate, and the RDA is expressed as mcg of Dietary Folate Equivalents. See Appendix E for a detailed discussion.

^cTotal number of supper plates observed at 12 sites.

n.a. = not applicable; RDA = Recommended Dietary Allowance.

TABLE V.19

COMPARISON OF MEAN NUTRIENT PROFILES
FOR SFSP MEALS AND SCHOOL MEALS

Nutrient	Breakfast			Lunch			
	SFSP	Standard Error	SNDA-II ^a	Standard Error	SFSP	SNDA-II ^a	Standard Error
Mean Amount							
Energy (kcal)	424	(28.3)	447	(5.7)	663	695	(6.9)
Protein (g)	15	(1.0)	15	(0.2)	27	29	(0.2)
Vitamin A (RE)	328	(26.8)	254	(4.4)	379	437	(15.7)
Vitamin C (mg)	38	(5.0)	37	(1.1)	27	27	(1.3)
Calcium (mg)	378	(13.1)	354	(4.5)	448	478	(4.0)
Iron (mg)	4.2	(0.4)	3.8	(0.1)	4.0	4.4	(0.1)
Cholesterol (mg)	53	(8.8)	43	(2.9)	57	65	(0.9)
Sodium (mg)	537	(59.3)	574	(10.5)	1,147	1,259	(15.3)
Mean Percentage of Calories from:							
Total fat	25.1	(1.5)	26.5	(0.4)	32.1	33.1	(0.3)
Saturated fat	10.9	(0.4)	10.1	(0.2)	11.9	11.9	(0.1)
Carbohydrate	60.7	(1.6)	61.5	(0.5)	52.1	51.4	(0.3)

SOURCE: SFSP Implementation Study, Site Observations (2001); and Fox et al. (2001).

NOTE: SFSP tabulations are weighted to be representative of breakfast and lunch meals served nationally.

^aData are for elementary schools in school year 1998-1999.

SFSP = Summer Food Service Program; SNDA-II = School Nutrition Dietary Assessment Study II.

dietary recommendations of 30 percent of calories or less from fat and 55 percent of calories or more from carbohydrate.

C. EXTENT OF PLATE WASTE

Plate waste is defined as foods selected by or served to children and left on the plate at the end of the meal. It does not include leftover meals that were not served to children or food wasted during meal preparation. It also does not include food items that children may have left in a specially designated area, known as a share box. The extent of plate waste in the SFSP is important because (1) it affects the nutritional benefit that children obtain from SFSP meals, and (2) it affects sponsors' costs and thus their ability to operate the SFSP cost-effectively.

Although some wasted food on children's plates is to be expected, many factors contribute to the amount of waste. Understanding the potential contributing factors can help menu planners to develop methods to reduce plate waste. Children's preferences, as well as the texture, flavor, and serving temperature of the food can affect waste. In addition to leaving foods they dislike, children may refuse to eat unfamiliar foods. Specific forms of preparation or presentation, such as whether fresh fruits are cut up, may influence acceptability. Children also may be less likely to eat hot foods that have been allowed to become cold or cold foods that are too warm. The amount of time children have to eat, how hungry they are at meal time, the environment (including cleanliness, comfort, and air or room temperature), and the site staff's interactions with the children are other factors that may influence plate waste. For example, interviewers reported that hot lunches were popular when served in air-conditioned rooms, but not when served outside on a hot day. Likewise, some cold items were too cold to eat. At some sites, for example, the milk and juice were frozen, and the turkey sandwiches were too cold to be eaten. Some fresh fruits were wasted because the fruit was unripe.

The way in which the meal is served also affects plate waste. Specifically, whether children can choose to refuse one or two items (as in OVS schools), whether they can choose from a selection of foods (such as between two types of sandwiches), and whether they can ask for a particular portion size (as opposed to receiving prepackaged foods in fixed portions) affect plate waste.

1. Nutrients Wasted on Plates

Plate waste has been shown to vary by age, sex, race/ethnicity, socioeconomic group, and meal environment (Reger et al. 1996; Dillon and Lane 1989; Devaney et al. 1995; and Ohls et al. 1988). In a study by Jansen and Harper (1978), high school students consistently wasted less food than did elementary school students. In a more recent study, by Reger et al. (1996), older elementary school students wasted more than did younger elementary school students.

Tables V.20, V.21, and V.22 show, for breakfast, lunch, and supper, respectively, the mean energy and nutrients wasted, the mean energy and nutrients served (for comparison purposes), and the percentage of nutrients wasted. Plate waste includes only food items that were left on plates—it does not include food items that children may have placed in a share box; thus, actual plate waste may have been underestimated.

TABLE V.20

MEAN AND PERCENTAGE OF NUTRIENTS WASTED AT BREAKFAST,
 BASED ON PLATE WASTE OBSERVATIONS^a

	Mean Waste	Standard Error	Total Mean Served	Standard Error	Percentage Wasted ^b
Macronutrients					
Energy (kcal)	141	(13.8)	424	(28.3)	33
Protein (g)	5.3	(0.58)	15.2	(1.02)	35
Total Fat (g)	4.4	(0.62)	12.8	(1.36)	34
Saturated fat (g)	1.9	(0.24)	5.3	(0.42)	36
Monounsaturated fat (g)	1.5	(0.21)	4.5	(0.53)	33
Polyunsaturated fat (g)	0.7	(0.15)	2.1	(0.42)	33
Carbohydrate (g)	20.8	(2.01)	63.8	(4.10)	33
Vitamins and Minerals					
Vitamin A (RE)	101	(10.4)	328	(26.8)	31
B Vitamins					
Thiamin (mg)	0.13	(0.016)	0.47	(0.042)	28
Riboflavin (mg)	0.26	(0.024)	0.80	(0.042)	33
Niacin (mg)	1.07	(0.172)	4.18	(0.462)	26
Vitamin B ₆ (mg)	0.13	(0.017)	0.48	(0.044)	27
Folate (mcg)	26	(3.9)	100	(9.7)	26
Vitamin B ₁₂ (mcg)	0.45	(0.042)	1.26	(0.074)	36
Vitamin C (mg)	11	(1.9)	38	(5.0)	29
Vitamin E (AE)	0.45	(0.079)	1.24	(0.173)	36
Calcium (mg)	141	(13.5)	378	(13.1)	37
Phosphorus (mg)	134	(12.8)	376	(14.6)	36
Magnesium (mg)	24	(2.2)	68	(3.0)	35
Iron (mg)	1.1	(0.18)	4.2	(0.40)	26

TABLE V.20 (continued)

	Mean Waste	Standard Error	Total Mean Served	Standard Error	Percentage Wasted ^b
Zinc (mg)	0.79	(0.084)	2.79	(0.177)	28
Copper (mg)	0.07	(0.011)	0.21	(0.022)	33
Potassium (mg)	266	(22.8)	729	(36.5)	36
Selenium (mcg)	6	(0.9)	19	(2.1)	32
Other Dietary Components					
Sodium (mg)	162	(23.7)	537	(59.3)	30
Cholesterol (mg)	19	(4.3)	53	(8.8)	36
Dietary Fiber (g)	0.8	(0.16)	2.4	(0.30)	33
Sample Size^c	815	—	—	—	—

SOURCE: SFSP Implementation Study, Site Observations (2001).

NOTE: Tabulations are weighted to be representative of breakfast meals nationally.

^aDoes not include waste from the share box items or discarded meals.

^bCalculated as mean nutrient wasted divided by the mean nutrient served times 100.

^cTotal number of plates observed at 85 sites.

TABLE V.21

MEAN AND PERCENTAGE OF NUTRIENTS WASTED AT LUNCH,
 BASED ON PLATE WASTE OBSERVATIONS^a

	Mean Waste	Standard Error	Total Mean Served	Standard Error	Percentage Wasted ^b
Macronutrients					
Energy (kcal)	210	(11.4)	663	(15.5)	32
Protein (g)	8.0	(0.47)	26.5	(0.74)	30
Total Fat (g)	7.7	(0.52)	24.8	(0.79)	31
Saturated fat (g)	2.6	(0.16)	9.0	(0.34)	29
Monounsaturated fat (g)	2.8	(0.20)	9.3	(0.36)	30
Polyunsaturated fat (g)	1.6	(0.18)	4.7	(0.27)	34
Carbohydrate (g)	28.6	(1.65)	87.3	(2.63)	33
Vitamins and Minerals					
Vitamin A (RE)	200	(56.8)	379	(55.3)	53
B Vitamins					
Thiamin (mg)	0.17	(0.010)	0.52	(0.021)	33
Riboflavin (mg)	0.23	(0.014)	0.77	(0.018)	30
Niacin (mg)	1.97	(0.180)	6.29	(0.302)	31
Vitamin B ₆ (mg)	0.15	(0.012)	0.50	(0.025)	30
Folate (mcg)	34	(2.2)	100	(3.7)	34
Vitamin B ₁₂ (mcg)	0.44	(0.034)	1.55	(0.057)	28
Vitamin C (mg)	9	(1.0)	27	(2.8)	33
Vitamin E (AE)	0.96	(0.089)	2.80	(0.166)	34
Calcium (mg)	131	(8.8)	448	(11.8)	29
Phosphorus (mg)	149	(8.3)	499	(13.2)	30
Magnesium (mg)	30	(2.0)	98	(3.0)	31
Iron (mg)	1.3	(0.08)	4.0	(0.12)	33

TABLE V.21 (continued)

	Mean Waste	Standard Error	Total Mean Served	Standard Error	Percentage Wasted ^b
Zinc (mg)	1.01	(0.063)	3.23	(0.097)	31
Copper (mg)	0.13	(0.009)	0.39	(0.014)	33
Potassium (mg)	316	(16.2)	1,008	(23.9)	31
Selenium (mcg)	11	(0.8)	33	(1.6)	33
Other Dietary Components					
Sodium (mg)	372	(25.7)	1,147	(55.5)	32
Cholesterol (mg)	16	(1.5)	57	(3.4)	28
Dietary Fiber (g)	2.1	(0.15)	5.5	(0.26)	38
Sample Size^c	1,570	—	—	—	—

SOURCE: SFSP Implementation Study, Site Observations (2001).

NOTE: Tabulations are weighted to be representative of lunch meals nationally.

^aDoes not include waste from the share box items or discarded meals.

^bCalculated as mean nutrient wasted divided by the mean nutrient served times 100.

^cTotal number of plates observed at 161 sites.

TABLE V.22

MEAN AND PERCENTAGE OF NUTRIENTS WASTED AT SUPPER,
 BASED ON PLATE WASTE OBSERVATIONS^a

	Mean Waste	Standard Error	Total Mean Served	Standard Error	Percentage Wasted ^b
Macronutrients					
Energy (kcal)	165	(31.6)	783	(62.1)	21
Protein (g)	8.4	(1.76)	39.8	(4.63)	21
Total Fat (g)	7.2	(1.47)	31.7	(1.70)	23
Saturated fat (g)	2.8	(0.63)	10.8	(0.78)	26
Monounsaturated fat (g)	2.5	(0.47)	12.2	(1.07)	20
Polyunsaturated fat (g)	1.3	(0.32)	6.0	(0.99)	22
Carbohydrate (g)	17.2	(3.03)	86.1	(10.55)	20
Vitamins and Minerals					
Vitamin A (RE)	123	(22.7)	500	(171.5)	25
B Vitamins					
Thiamin (mg)	0.11	(0.019)	0.51	(0.042)	22
Riboflavin (mg)	0.21	(0.044)	0.80	(0.017)	26
Niacin (mg)	1.92	(0.440)	10.53	(1.415)	18
Vitamin B ₆ (mg)	0.16	(0.030)	0.72	(0.083)	22
Folate (mcg)	24	(5.1)	117	(11.8)	21
Vitamin B ₁₂ (mcg)	0.50	(0.155)	1.63	(0.271)	31
Vitamin C (mg)	9	(2.1)	37	(12.8)	24
Vitamin E (AE)	0.87	(0.180)	3.54	(0.344)	25
Calcium (mg)	119	(39.7)	357	(55.5)	33
Phosphorus (mg)	133	(29.3)	535	(16.6)	25
Magnesium (mg)	25	(3.9)	101	(11.2)	25
Iron (mg)	1.1	(0.22)	5.1	(0.70)	22

TABLE V.22 (continued)

	Mean Waste	Standard Error	Total Mean Served	Standard Error	Percentage Wasted ^b
Zinc (mg)	1.17	(0.272)	4.70	(0.651)	25
Copper (mg)	0.10	(0.022)	0.44	(0.074)	23
Potassium (mg)	294	(44.3)	1,115	(118.6)	26
Selenium (mcg)	9	(1.8)	45	(6.0)	20
Other Dietary Components					
Sodium (mg)	336	(69.2)	1,394	(103.8)	24
Cholesterol (mg)	25	(4.0)	128	(17.1)	20
Dietary Fiber (g)	1.4	(0.33)	5.9	(1.02)	24
Sample Size^c	119	—	—	—	—

SOURCE: SFSP Implementation Study, Site Observations (2001).

NOTE: Tabulations are weighted to be representative of supper meals nationally.

^aDoes not include waste from the share box items or discarded meals.

^bCalculated as mean nutrient wasted divided by the mean nutrient served times 100.

^cTotal number of plates observed at 12 sites.

SFSP = Summer Food Service Program.

On average, children wasted about one-third of energy and nutrients at breakfast and at lunch, with the percentage of waste for most nutrients falling in the range of 30 to 36 percent. Mean nutrients wasted at breakfast ranged from 26 percent for niacin, folate, and iron to 37 percent for calcium. Mean nutrients wasted at lunch ranged from 28 percent for vitamin B₁₂ and cholesterol to 53 percent for vitamin A.

On average, children wasted fewer nutrients at supper than at breakfast or lunch, probably because suppers were served primarily at residential camps attended by older, active children. An average of about 20 percent of energy was wasted at supper; the mean percentage of nutrients wasted ranged from 18 percent (for niacin) to 33 percent (for calcium), with most waste falling in the range of 20 to 26 percent.

Compared with these findings, two studies of plate waste in the NSLP found that lower levels of nutrients were wasted; however, the setting and methods in those studies and in the current study differed. The 1992 School Nutrition Dietary Assessment Study (SNDA-I) estimated that about 12 percent of the calories students selected as part of school lunches were wasted, with waste of individual nutrients ranging from 10 to 15 percent (Devaney et al. 1995). However, waste was assessed in a very different manner than in the current study; it was based on students' answers to questions about incompletely consumed foods at school, rather than on direct observation or measurement, as in the current study.

At breakfast, average waste of energy and nutrients generally was lower at nonschool-sponsored sites than at school-sponsored sites (Table F.15 and Table F.16, respectively). At lunch, however, similar patterns of average nutrient waste were observed at school- and nonschool-sponsored sites (Table F.17 and Table F.18, respectively).

Sites sponsored by schools may use the OVS option. The intent of this option is to reduce plate waste; however, we did not observe significantly less plate waste at OVS sites than at non-OVS school-sponsored sites. Several factors may explain why the interviewers did not observe less plate waste at school-sponsored OVS sites than at non-OVS school-sponsored sites:

- Only 42 of 78 SFA-sponsored sites visited had sponsors that claimed to use OVS. It often was difficult to ascertain whether a site was using OVS. Many site staff were unfamiliar with the terms "OVS" and "offer versus serve," so interviewers could not ask whether OVS was used. The method for identifying an OVS site used here is based on whether the sponsor was an SFA, and whether the sponsor reported using OVS. However, sponsors may not have used OVS at some of their sites.
- The presence of interviewers on site may have affected normal procedures; some site staff who normally allowed children to refuse one or two food items at an OVS lunch may have insisted that children take all the items.³³

³³Interviewers at several sites reported their impressions that staff had urged the children to take more than their normal amount of food.

2. Foods Wasted on Plates

Expressing plate waste as a percentage of energy or other nutrients provides a measure of the overall extent of waste. To determine which foods contributed to the waste of nutrients, the study calculated the percentage of the most commonly served foods wasted (based on weight, in grams) and the percentage of foods in each major food category wasted; these calculations were made for breakfast and for lunch. (Sample sizes at supper were too small to produce reliable estimates.)

Eleven percent of breakfast plates had no waste (Table V.23). The percentage of waste in the different food categories varied somewhat but generally was less than one-third. Waste ranged from approximately 27 percent for the meat/meat alternate and mixed dish categories to 38 percent for the milk category. With the exception of 1-percent chocolate milk, children wasted about one-third of milk, regardless of type, which explains the 37 percent of calcium wasted at breakfast. Table V.23 also highlights some foods that were popular with children, and some that were less popular. For example, children wasted only 18 percent of their cereal, and only 21 percent of their doughnuts. However, they wasted 57 percent of graham or animal crackers and 53 percent of applesauce.

At lunch, as at breakfast, 11 percent of plates contained no waste (Table V.24). The percentage of foods wasted, by food category, ranged from about 30 percent (milk) to about 48 percent (vegetables), indicating higher waste among some food categories at lunch than at breakfast. (The “other beverage” category had only 10 percent waste.) On average, children wasted about 30 percent of their milk at lunch, and they wasted less chocolate milk than white milk. In the dairy category, they wasted more processed cheese than natural cheese. More than 40 percent of the following commonly served fruits were wasted: cooked or canned peaches; cooked, canned, or fresh apples; applesauce; canned pineapple; and grape juice. Possible explanations for fruit waste include serving fruit that was unripe, or that would have been more appealing if it had been peeled or sliced first. Commonly served vegetables with more than 40 percent waste were raw carrots, lettuce, tomatoes, and salad with assorted vegetables. Among commonly served breads, about 40 percent of white bread and rolls were wasted. Within the meat/meat alternate category, luncheon meat and bologna had the highest mean waste (43 percent and 39 percent, respectively).

Other studies provide some context on foods wasted by children in the SFSP and the NSLP. The previous national study of the SFSP, by Ohls et al. (1988), measured plate waste at lunch and found that 20 to 36 percent of food was wasted in the four key food groups (milk, meat, bread, and fruits/vegetables). Milk was wasted most often, followed by fruits/vegetables, meat, and bread. In the study of plate waste in the NSLP by Reger et al. (1996), salad accounted for the highest mean percentage of plate waste (63 percent), followed by vegetables other than potatoes (54 percent), and by 1-percent chocolate milk (48 percent) and whole white milk (48 percent). The mean percentage of plate waste of the remaining items ranged from 17 percent (dessert) to 37 percent (potatoes). An important difference between the current study and the NSLP study was that the latter was conducted at a school using OVS.

The range of plate waste among specific foods or food groups presented here is similar to the ranges found in the studies by Ohls et al. and Reger et al. For example, children wasted

TABLE V.23

PERCENTAGE OF MOST COMMONLY SERVED BREAKFAST FOODS WASTED,
BY FOOD CATEGORY

Food Category	Percentage of All Plates Containing Food	Standard Error	Percentage of Each Food Wasted	Standard Error	Percentage of Each Food Category Wasted	Standard Error
Milk					37.6	(2.55)
2-percent white milk	31.8	(10.93)	35.1	(4.34)		
Whole white milk	28.8	(7.98)	37.2	(3.59)		
1-percent white milk	16.8	(4.48)	31.1	(5.02)		
1-percent chocolate milk	14.2	(6.21)	53.6	(11.96)		
Dairy ^a					30.1	(4.52)
Yogurt	7.4	(5.61)	26.9	(4.03)		
Processed cheese	6.9	(4.30)	35.2	(7.53)		
Fruit					31.0	(2.92)
Orange juice	39.8	(9.28)	22.8	(4.12)		
Apple juice	20.4	(7.16)	25.3	(6.99)		
100-percent fruit juice blend	8.1	(3.74)	28.2	(5.33)		
Nectarine	5.6 ^b	(5.40 ^b)	88.8 ^b	(0.00 ^b)		
Applesauce, apples (cooked or canned)	5.3	(2.56)	52.6	(12.16)		
Vegetable					30.2	(3.97)
Bread/Bread Alternate					29.9	(3.26)
Cereal	54.8	(9.18)	18.2	(3.44)		
White bread	11.7	(5.38)	31.1	(2.65)		
Dark bread (whole wheat, rye, bran)	9.1	(7.58)	25.1	(4.65)		
Sweet roll, breakfast tart, coffee cake, funnel cake, churro	8.0	(5.87)	22.9	(6.97)		
Doughnut	5.7	(3.21)	20.9	(3.09)		
Crackers (animal, graham)	5.1	(3.40)	57.4	(8.06)		
Meat/Meat Alternate ^c					26.6	(4.10)
Eggs	7.7	(3.26)	30.4	(5.53)		
Mixed Dish ^d					27.2	(7.75)
Other Beverage ^e					28.9	(2.55)
Plates with No Waste	11.2	(2.18)				
Sample Size^f	556	—	815	—	—	—

SOURCE: SFSP Implementation Study, Site Observations (2001).

TABLE V.23 (continued)

NOTE: Tabulations are weighted to be representative of breakfast meals nationally.

^aExcludes milk. Dairy items are considered meat alternates.

^bEstimates may be unreliable due to small sample size.

^cThe meat/meat alternate is not a requirement at breakfast.

^dMay include combinations of meat, dairy, bread, and vegetable items. Items counted as part of mixed dishes are not counted in these separate categories.

^eOther beverages include soft drinks, iced tea, and fruit-juice drinks, which contain less than 100-percent fruit juice.

^fRepresents total number of plates observed at breakfast.

TABLE V.24

PERCENTAGE OF MOST COMMONLY SERVED LUNCH FOODS WASTED,
BY FOOD CATEGORY

Food Category	Percentage of All Plates Containing Food	Standard Error	Percentage of Each Food Wasted	Standard Error	Percentage of Each Food Category Wasted	Standard Error
Milk					29.6	(3.19)
1-percent chocolate milk	37.2	(5.88)	29.5	(3.07)		
2-percent white milk	14.5	(4.36)	34.6	(9.36)		
Whole white milk	14.2	(2.87)	22.0	(6.57)		
2-percent chocolate milk	12.8	(5.25)	19.4	(2.85)		
1-percent white milk	9.3	(2.49)	24.7	(5.28)		
Skim chocolate milk	5.9	(3.49)	23.3	(2.68)		
Dairy ^a					45.4	(7.38)
Processed cheese	18.7	(4.21)	36.8	(3.23)		
Natural cheese	8.0	(3.08)	24.8	(6.86)		
Fruit					37.2	(3.63)
Peaches (cooked or canned)	13.4	(4.20)	55.5	(13.27)		
Apple juice	10.2	(3.39)	32.6	(9.74)		
Cantaloupe, honeydew, watermelon	10.0	(4.51)	28.9	(6.45)		
Orange (raw)	9.7	(4.02)	33.8	(5.38)		
Applesauce, apples (cooked or canned)	8.5	(2.45)	42.2	(4.38)		
Apple (raw)	8.2	(3.59)	47.6	(12.57)		
Banana (raw)	7.8	(3.37)	35.5	(9.82)		
100-percent fruit juice blend	7.7	(3.10)	20.1	(8.21)		
Pineapples (canned)	7.0	(2.66)	44.9	(8.79)		
Fruit cocktail	6.9	(2.81)	32.2	(5.75)		
Grape juice	5.9	(2.39)	61.7	(30.0)		
Pears (cooked or canned)	5.7	(2.09)	34.4	(7.30)		
Vegetable					48.3	(4.49)
French fries	10.3	(4.24)	18.9	(2.31)		
Carrots (raw)	9.6	(3.25)	73.1	(14.39)		
Corn	9.5	(3.30)	36.1	(5.07)		
Lettuce (raw)	8.1	(2.46)	47.9	(5.45)		
Tomatoes (raw)	7.4	(2.35)	57.0	(5.32)		
Salad with assorted vegetables	5.7	(3.18)	65.8	(10.83)		
Pickles	5.7	(2.11)	33.0	(6.93)		
Bread/Bread Alternate					38.6	(2.99)
Rolls (white, egg, hoagie)	28.6	(4.57)	41.4	(4.62)		
White bread	20.7	(5.93)	40.0	(4.89)		

TABLE V.24 (continued)

Food Category	Percentage of All Plates Containing Food	Standard Error	Percentage of Each Food Wasted	Standard Error	Percentage of Each Food Category Wasted	Standard Error
Dark bread (whole wheat, rye, bran)	11.8	(3.56)	30.3	(7.24)		
Crackers (animal, graham)	11.3	(3.95)	36.7	(8.36)		
Cookies	9.8	(2.65)	18.7	(4.10)		
Salty snacks	6.2	(2.94)	20.8	(7.35)		
Meat/Meat Alternate					35.7	(5.87)
Luncheon meat	18.6	(4.01)	42.5	(6.07)		
Bologna	8.6	(2.86)	39.3	(6.54)		
Peanut butter	6.3	(1.93)	15.6	(11.11)		
Ground beef	5.5	(2.22)	24.2	(4.62)		
Mixed Dish ^b					31.6	(2.75)
Pizza	15.7	(4.49)	32.8	(7.15)		
Other Beverage ^c					10.0	(4.58)
Plates with No Waste	10.6	(1.45)				
Sample Size^d	989	—	1,570	—	—	—

SOURCE: SFSP Implementation Study, Site Observations (2001).

NOTE: Tabulations are weighted to be representative of lunches nationally.

^aExcludes milk. Dairy items are considered meat alternates.

^bMay include combinations of meat, dairy, bread, and vegetable items. Items counted as part of mixed dishes are not counted in these separate categories.

^cOther beverages include soft drinks, iced tea, and fruit-juice drinks, which contain less than 100-percent fruit juice.

^dRepresents total number of plates observed at lunch.

about 66 percent of the salad served in SFSP lunches, compared with 63 percent of salad in NSLP lunches. When vegetables (including potatoes) were served in SFSP lunches, about 48 percent remained on the plate as waste. Although children wasted less than 30 percent of the 1-percent chocolate milk served at SFSP lunches, nearly 54 percent of it was wasted at breakfast, which was slightly higher than the percentage of waste reported by Reger et al. In addition, the amount of SFSP whole white milk wasted at breakfast and at lunch (22 percent and 37 percent, respectively) was less than the amount reported by Reger et al. (48 percent).

The extent of plate waste for specific foods generally is not what would be expected based on site supervisors' views about the children's most liked and least liked foods. Based on site supervisors' reports, one would expect children to waste more dark bread (whole wheat, rye, or bran) than white bread, yet the converse was true (31 versus 25 percent at breakfast). However, almost 40 percent of bologna was wasted, which is consistent with the staff's ranking of bologna as the meat "liked the least." Although the staff ranked canned peaches second among the most-liked fruits, children wasted an above-average amount (almost 56 percent). Conversely, fruit juice blend, with a below-average waste (20 percent) was not on the staff's list of popular fruits. Raw carrots, with a plate waste of 73 percent, ranked first among the vegetables with higher-than-average waste and ranked first on the list of most-liked vegetables. One explanation for these discrepancies is that serving sizes may provide more food than some children are able to eat during a meal. It is also possible that the distribution of waste provides a different picture of plate waste than does an examination of mean waste across sites; foods that are well-liked in some places, but disliked in others, may have average levels of waste overall.

Food waste and, therefore, nutrient waste generally was lower at supper than at breakfast or lunch. Suppers were served primarily at camps, and children attending camps generally were older and more active throughout the day than were children attending other types of sites. Twelve percent of supper plates had no waste. With the category "other beverages" excluded, waste among food categories ranged from 12 percent for fruit to 44 percent for milk. The meat/meat alternate category had mean waste of 21 percent, and the vegetable category had mean waste of 30 percent.

3. Reasons for Food Waste

During their interview, site supervisors were asked to provide explanations for waste in general at their sites, including plate waste and other types of waste. Only about 3 percent of site supervisors stated that food was never wasted. The main explanation for food waste was that children did not like the food (68 percent). Approximately 17 percent of site supervisors reported that fluctuations in attendance was the main reason that their site had food waste; 6 percent reported that bad weather (leading some children to stay home) was the main reason. Both of these responses suggest that most of these sites' waste was in the form of leftover meals, rather than plate waste. A small percentage of site supervisors (fewer than 5 percent) reported other reasons, such as children being served more food than they could eat (plate waste), and insufficient on-site storage space (other waste). In addition, interviewers observed that young children did not always have enough time to finish their meals, which might explain some of the plate waste among this group of program participants.

