VII. FOOD AND NUTRIENT COMPOSITION OF NSLP MEALS

This chapter presents results of the analysis of data gathered in the on-site meal observations. The analysis examines the food and nutrient composition of the average NSLP meal at three levels: (1) as offered by participating schools, (2) as selected by participating students, and (3) as actually consumed by participating students. At each level, the overall nutritional adequacy of the average NSLP meal is evaluated in light of the stated program goal of providing approximately one-third of the Recommended Dietary Allowances for essential nutrients. The nutrient density of average NSLP meals is examined, as well as the fat, cholesterol and sodium content. Finally, food-level analyses are presented which provide information on the types of food offered to students in the NSLP, the foods students typically select from those available, and the foods students tend to waste.

BACKGROUND

The National School Lunch Program was established in 1946 with two objectives: "...to safeguard the health and well-being of the Nation's children and to encourage the domestic consumption of nutritious agricultural commodities and other foods."1/ Approximately 88.5 percent of all elementary and secondary school students have the program available to them and, on an average day, about 24 million lunches are served.2/

USDA provides two types of Federal assistance to schools serving NSLP meals: cash reimbursements and donated commodities. In order to be eligible for Federal reimbursement, lunches must comply with meal pattern requirements as set forth in program regulations. The meal pattern is designed to ensure "...that the nutrients of the lunch, averaged over a period of time, approximate one-third of the Recommended Dietary Allowances (RDA) for children in each age/grade group."3/ The pattern specifies both the components (types of food to be included in an NSLP meal), and quantities (minimum portions of food) to be served for children in various age groups. The current NSLP meal pattern requirements are summarized in Exhibit VII.1.

1/National School Lunch Act of 1946, P.L. 79-396.

2/Annual Historical Review of FNS Programs: Fiscal Year 1989. USDA, Food and Nutrition Service, 1990.

3/7 CFR 245, Part 210.

Exhibit VII.1

NSLP Meal Pattern Requirements

Food Components	Food Items	Minimum Required Quantities: Gr[illegible] K-3 A[illegible] 8 (Group III)	Minimum Required Quantities: Grades 4-12 Age 9 and over (Group IV)	Recommended Quantities*: Grades 7-12 Age 12 and over (Group V)	Specific Requirements
Meat or Meat Alternate (quantity of the edible portion as served)	A serving of one of the following or a combination to give an equivalent quantity:				• Must be served in the main dish or the main dish and only one other menu item.
	Lean meat, poultry, or fish	1-1/2 oz	2 oz	3 oz	• Vegetable protein products, cheese alternate products, and enriched macaroni with fortified protein may be used to meet part of the meat or meat alternate requirement.
	Cheese	1-1/2 oz	2 oz	3 oz	
	Large egg(s)	3/4	1	1-1/2	
	Cooked dry beans or peas	3/8 cup	1/2 cup	3/4 cup	
	Peanut butter or other nut or seed butters	3 Tbsp	4 Tbsp	6 Tbsp	
Vegetable or Fruit	2 or more servings of vegetables and/or fruits to total:	1/2 cup	3/4 cup	3/4 cup	• No more than one-half of the total requirement may be met with full-strength fruit or vegetable juice. • Cooked dry beans or peas may be used as a meat alternate or as a vegetable, but not as both in the same meal.
Bread or Bread Alternate	Servings of bread or bread alternate	8 per week minimum of 1 serving per day	8 per week minimum of 1 serving per day	10 per week minimum of 1 serving per day	• Breads or bread alternates must be enriched or whole grains • Enriched macaroni with fortified protein may be used as a meat alternate or as a bread alternate, but not as both in the same meal.
	A serving is a slice of bread or an equivalent serving of biscuits, rolls, etc., or 1/2 cup of cooked rice, macaroni, noodles, other pasta products or cereal grains, or a combinat[illegible]f any of the above.				
Milk (as a beverage)	Fluid whole milk and fluid unflavored lowfat milk, skim milk, or buttermilk must be offered.	1/2 pint (8 fl oz)	1/2 pint (8 fl oz)	1/2 pint (8 fl oz)	

*Recommended (but not required) quantities for children 12 years of age and older.

Program regulations stipulate that students must be offered all five food items (meat/meat alternate, 2 fruit and/or vegetable choices, bread/bread alternate, and milk) each day. Under the Offer-vs-Serve (OVS) provision, introduced in 1975, largely in response to concerns about the amount of plate waste in the program, senior high students are allowed to refuse up to two of the five food items and still have the lunch qualify as a reimbursable meal.1/ Since 1981, the option has been extended, at the discretion of the SFA, to schools below the senior high level, and students may be permitted to decline either one or two of the five food items.

The nutritional value of NSLP meals was last studied in SY 1980-81, in the National Evaluation of School Nutrition Programs (NESNP-I).2/ A number of significant changes have occurred in the past decade that create the need for more current information. Primary changes include the increased use of processed food items in the NSLP, the availability of new foods in the marketplace, and new USDA commodities. In addition, the Recommended Dietary Allowances (RDAs), the standards traditionally used in evaluating nutritional adequacy have recently been updated, and the current standards for several nutrients are different than the 1980 standards.3/ Most significantly, the RDAs for vitamin B_6, iron and magnesium (nutrients frequently found to be low in school lunches) have decreased for several age groups. Standards for other key nutrients have also changed (increased or decreased) for some groups of children. The analyses presented in this report evaluate the nutritional quality of NSLP meals served in SY 1989-90 in light of the most recent recommendations for nutrient intake.

KEY RESEARCH ISSUES

The primary objective of this portion of the study is to examine the food and nutrient composition of NSLP meals at three levels:

- as offered, i.e., meals planned in accordance with program guidelines and made available to participating students;

1/ 7 CFR 245, Part 210. Senior high is defined by each State Educational Agency.

2/Wellisch, J.B., S.D. Hanes, L.A. Jordan, K.M. Maurer, and J.A. Vermeersch. The National Evaluation of School Nutrition Programs: Final Report. Santa Monica, CA: Systems Development Corporation, 1983. (referred to as NESNP-I)

3/National Research Council, Committee on Dietary Allowances. Recommended Dietary Allowances, tenth edition. Washington, D.C.: National Academy Press, 1989.

- as selected, i.e., the combination of foods actually selected by students from all the options available to them; and

- as consumed, i.e., the portions of food actually consumed by students.

A secondary objective is to examine potential nutritional differences between exemplary and typical SFAs and between elementary and middle/secondary schools.1/

The following research questions were addressed for each level of analysis--meals as offered, selected and consumed:

- What is the nutrient content of the average NSLP meal?

- How does the nutrient content of the average NSLP meal compared to the program goal of one-third of the RDA?

- What is the nutrient density or quality of the average NSLP meal?

- What is the fat, saturated fat, cholesterol, and sodium content of the average NSLP meal?

Research questions were also posed to assess nutritional differences among NSLP meals as offered, selected and consumed:2/

- Is the nutrient content of the average NSLP meal as selected significantly different from the nutrient content of the average meal offered?

- Is the nutrient content of the average NSLP meal consumed significantly different from the nutrient content of the average NSLP meal selected?

1/Exemplary SFAs were reported to have initiated some efforts to decrease the amount of fat and/or sodium in school meals. The 10 exemplary SFAs were selected from a pool of 70 SFAs that were nominated by FNS Regional Office staff, the American School Food Service Association and directors of State Child Nutrition Programs (see Chapter I).

2/The original plans for this study also included research questions designed to assess the nutritional impact of the OVS option by comparing the nutrient content of meals offered, selected and consumed in elementary schools with and without the OVS option. The final sample of elementary schools that was purported to not practice OVS was too small, however, (n = 12) to support meaningful analysis.

A number of additional research questions related to food availability, food selection and food consumption are also addressed within the appropriate analysis:

Meals offered

- How much choice is available to students, i.e., how often are students offered choices within a major meal component category?

- What specific foods are being offered to students in NSLP meals?

- Are there differences between elementary and middle/secondary schools in terms of the specific types and amounts of food offered to students?

Meals selected

- In the presence of the offer-vs-serve (OVS) option, how many of the five items included in the NSLP meal pattern do students select? Which items are refused (not selected) most often?

- Of the specific foods available in each meal component category, which do students select most often?

- Are there differences between elementary and middle/secondary schools in terms of the number or types of food items selected by students?

- How many schools offer a la carte items in the same serving line as NSLP meals? What food items are typically available on an a la carte basis?

- Does the availability of a la carte items vary by school type?

- What proportion of children select one or more a la carte items, in addition to their NSLP meal, when a la carte items are available?

Meals consumed

- How much of the food that students select in NSLP meals is actually consumed, in total, and by food type?

- Are there differences in food consumption between elementary and middle/secondary school students?

DATA AND VARIABLES

Data were gathered in mid-March, 1990. On-site meal observations were conducted in 60 schools within 20 SFAs. In each school, observations were conducted at lunch time for 5 consecutive days.1/ Two separate analyses (nutrient content and food composition) were undertaken at three different levels (meals offered, selected and consumed.) The following section summarizes the analytic approach and variables used in each analysis.

Nutrient Content Analysis

In structuring the nutrient content analysis, several key analytic issues were addressed: 1) defining the appropriate unit of analysis, 2) determining how to best aggregate the available meal observation data, 3) identifying key nutrients to be included in the analysis, as well as the nutrient data base to be used in determining nutrient content, and 4) identifying appropriate reference nutrient intake standards. Each of these issues, and the resolutions used in this study, are described below.

Unit of Analysis. As outlined in Chapter I, data were collected on 297 NSLP meals offered to students, 16,571 meals selected by participating students, and 3,470 meals as actually consumed. A key issue for this analysis was determining how to utilize these data to develop an appropriate measure of the average NSLP meal as offered, selected and consumed.

The NSLP meal pattern is designed "...so that the nutrients of the lunch, averaged over a period of time, approximate one-third of the Recommended Dietary Allowances for children of each age/grade group...."2/ Moreover, the National Research Council (NRC) specifically states that group feeding programs should endeavor to plan menus so that the appropriate portion of the RDA is provided in a 5 to 10 day menu rotation rather than in each individual day's menu.3/

In light of the program regulations and NRC recommendations, the appropriate approach to evaluating the nutrient content of NSLP meals is to average across the five days of observation rather than consider the meals observed on each of the five days individually. Similarly, observations of meals selected or

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1/Basic data collection procedures and available sample sizes are described in Chapter I; a more detailed description of the observation methodology is included in Appendix B.

2/7 CFR 245, Part 210.

3/National Research Council, Committee on Dietary Allowances. Recommended Dietary Allowances, tenth edition, Washington, D.C.: National Academy Press, 1989.

consumed by individual students should also be averaged rather than evaluated individually. The unit of analysis, then, for evaluation of nutrient content of NSLP meals is the average meal offered, selected and consumed in each of the 60 schools.

Data Aggregation. The following section describes how the meal observation data were aggregated to determine daily, and then weekly, measures of the nutrient content of NSLP meals as offered, selected and consumed. The specific nutrients included in the analysis and the methods used to convert the meal observation data to nutrient equivalents are described in a subsequent section.

Meals Offered. The concept of "the average NSLP meal as offered" was perhaps the most challenging one in this analysis. To describe accurately the meals offered to participating children, all available menu options had to be taken into consideration. Many schools offer students a choice of items within an NSLP meal component category, for example a choice between whole milk, chocolate milk, low-fat milk and skim milk, or the choice of an apple, a banana or a glass of orange juice as one of the two fruit and vegetable selections. Moreover, some schools offer multiple complete meals, e.g., a salad bar, a hot lunch or a sandwich-based lunch. Sometimes these alternatives are packaged as discrete units or offered in separate serving areas; other times all options are available in one location and students can select any of the available food items, in any combination, as long as the meal selected meets the requirements for a reimbursable meal.

The three most common situations encountered, and the operational definitions used to define the average NSLP meal as offered are described below. Exhibit VII.2 provides examples of the first two situations.

- Situation 1: Students are served one entree but have multiple choices for one or more of the other meal component categories. To reflect the full range of options available in this situation, the nutrient content of the typical meal was computed by first summing the nutrients for the meal components where only one option was available (in the example presented in Exhibit VII.2, hamburger (meat) and bun (bread)), and then adding the average nutrient content for the meal components where more than one choice was available (in this example milk, fruit and vegetable).

- Situation 2: Students have multiple options available in all meal component categories. Because in these situations students could literally mix and match the available components to create a reimbursable meal, the nutrient content of the average meal was determined by summing the average nutrient content for each meal component category, as illustrated in Exhibit VII.2.

Exhibit VII.2

Examples of Food Availability in Selected Schools:
Situations Commonly Encountered in Data Collection and
Methods Used to Operationally Define
Nutrient Content of NSLP Meals "As Offered"

NSLP Meal Component	Food Items Available	Operational Definition of Nutrient Content of Meal Offered
Situation 1		
Milk	Whole milk Chocolate milk Lowfat milk	1. Determine average nutrient content of available milk choices.[1]
Meat/Meat Alternate Bread/Bread Alternate	Hamburger patty on bun	2. Determine nutrient content of hamburger on bun
Fruit/Vegetable	Canned pineapple Fresh orange	3. Determine average nutrient content of available fruit choices.[2]
	French fries Cooked carrots	4. Determine average nutrient content of available vegetable choices.
		5. Add values determined in steps 1 through 4 to compute nutrient content of average meal as offered.
Situation 2		
Milk	Whole milk Lowfat milk Chocolate milk Skim Milk	1. Determine average nutrient content of available milk choices.
Meat/Meat Alternate Bread/Bread Alternate	Hamburger on bun Grilled ham and cheese Fish nuggets with biscuit	2. Determine average nutrient content of available entrees.
Fruit/Vegetable	Orange juice Canned pears Fresh apple	3. Determine average nutrient content of available fruit choices.
	Lettuce salad French fries	4. Determine average nutrient content of available vegetable choices.
		5. Add values determined in steps 1 through 4 to compute nutrient content of average meal as offered.

[1]An alternative to use of the average of all available choices would have been to use the nutrient content of the food item most frequently selected. This approach was rejected, however, because it would have combined the separate concepts of meals offered and meals selected.

[2]NSLP meal pattern requirements specify that two fruits and/or vegetables must be included in a pattern meal. The decision to handle fruits and vegetables separately was based on the fact that most meals were actually offered to students this way, i.e., meals were most often merchandised so that fruits and vegetables were offered separately and students were encouraged to take one fruit and one vegetable. In the rare situations where either only fruits or only vegetables were offered, the average of all available options was determined, and this value was factored in to the total twice.

- Situation 3: Students can select a meal from multiple, discrete serving areas (e.g., salad bar, hot lunch line, sandwich/deli bar). Prior to data collection, an agreement was reached by project staff at AAI and FNS that data collection logistics would not allow one observer to observe students selecting foods (and then track trays for measurement of plate waste) in more than one serving area on any given day. It was therefore decided that in these situations observations of the various types of meal service would be spread across the week, giving emphasis to the line(s) that the food service director indicated were most heavily used by students purchasing or receiving NSLP meals. Descriptions of foods offered on each day were therefore linked to the specific line being observed each day. While only one type of meal was observed each day, when these daily observations were averaged over the five day period, it created a reasonable representation of the average meal offered.

Exhibit VII.3 illustrates how daily meal observation data were combined across the five days of observation to determine the nutrient content of the average NSLP meal as offered in each school. As shown, the nutrient content of the average NSLP meal offered on each day in each school was first determined, using the approaches outlined above. The five daily "average meals" were then aggregated within each school to determine the nutrient content of the average NSLP meal offered in each school.

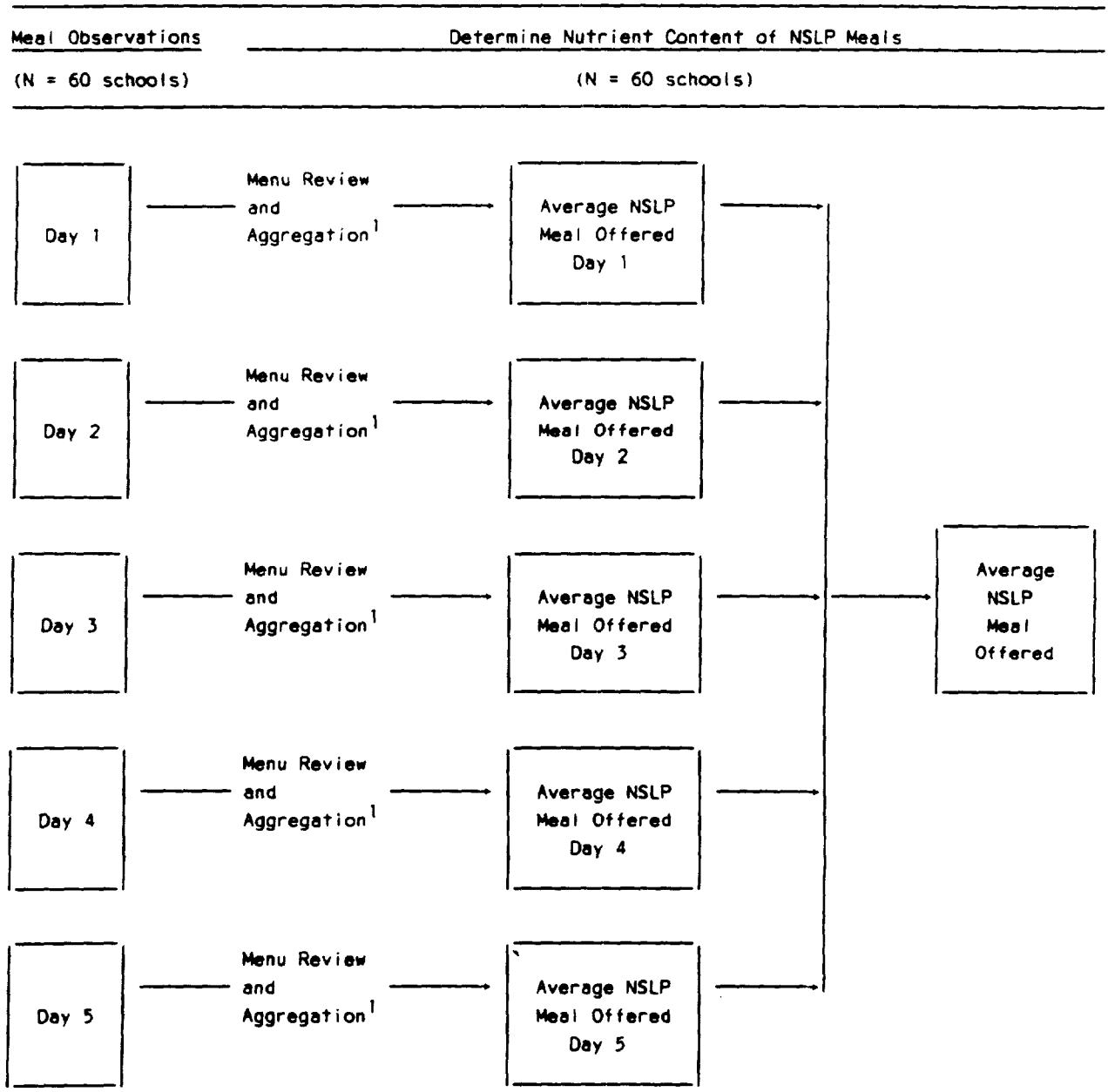
Meals Selected. To obtain data on which foods children select for inclusion in an NSLP meal, field staff observed and recorded the foods included in meals selected by up to 60 children each day in each of the 60 sample schools. Because the focus of the study is the NSLP meal, only reimbursable meals were included in the observations. The definition of a reimbursable meal depended on whether or not the school utilized the offer-vs-serve (OVS) option. Thus, children in OVS schools who selected a meal that included fewer than 3 of the 5 required items were not included in the observations.1/

Exhibit VII.4 illustrates the process used to determine the nutrient content of the average NSLP meal as selected. The nutrient content of the average meal selected in each school on each day of observation was first determined by averaging across all student observations. These daily measures were then averaged across the five days of observation to determine the nutrient content of the average NSLP meal as selected in each school.

1/A la carte items that students may have selected (e.g., chips, desserts, snack foods) were not recorded. Field staff did, however, note whether students took any a la carte items by using a simple check system--a check was recorded if any a la carte items were present on the tray, and left blank if no a la carte items were included.

Exhibit VII.3

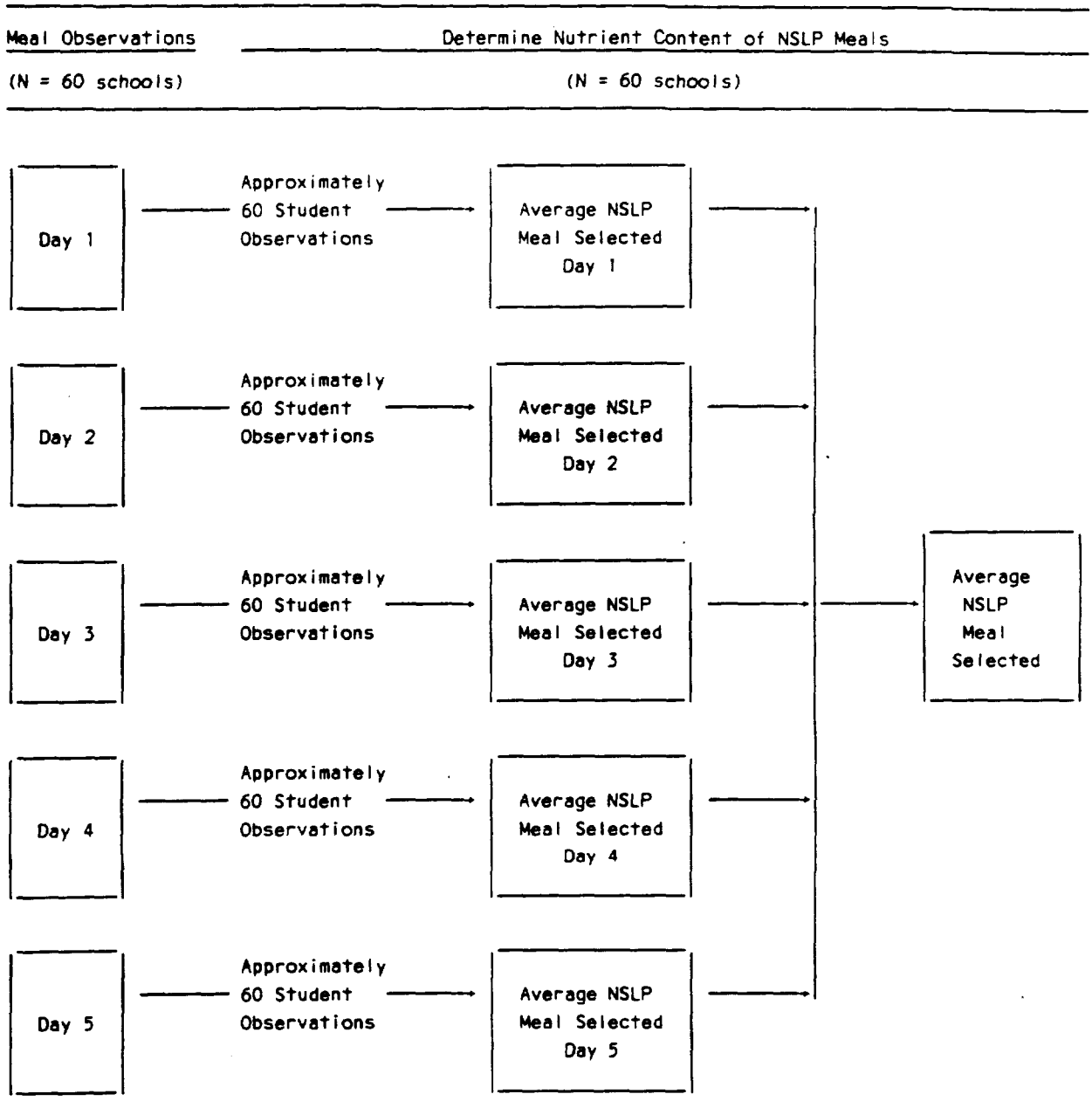
Determination of the Nutrient Content of the Average NSLP Meal Offered



[1]See Exhibit VII.2.

Exhibit VII.4

Determination of the Nutrient Content of the Average NSLP Meal Selected



Meals Consumed. On each day of observation, the trays of 12 of the approximately 60 children whose food selection had been observed were examined for plate waste. The amount of each selected food item that was not consumed was visually estimated, as described in Appendix B. The nutrient content of the meal consumed by each of these children was determined by subtracting the nutrients contained in the portions of food that were wasted from the total nutrients contained in the meal selected:

Nutrients in meal selected	-	Nutrients in foods wasted	=	Nutrients in meal consumed

For each school, the data were averaged across observations to compute daily measures, and then across the five days of observation to compute the nutrient content of the average NSLP meal as consumed (Exhibit VII.5).

Determining Nutrient Content. Data on the specific food items and quantities included in NSLP meals as offered, selected, and consumed were converted into nutrient equivalents using the USDA-Human Nutrition Information Service (USDA-HNIS) Nutrient Data Base for Individual Food Intake Surveys, Version 4 (Survey data base). This data base has been used in many national nutrition surveys, including the 1977-78 and 1987 Nationwide Food Consumption Surveys, the 1985 Continuing Survey of Food Intakes by Individuals, and the most recent National Health and Nutrition Examination Surveys (Hispanic HANES, and NHANES III). It contains nutrient information on over 5,000 individual food items.

The Survey Data Base includes data on over 30 nutrients. The specific nutrients examined in this study, identified jointly by FNS and AAI, include:

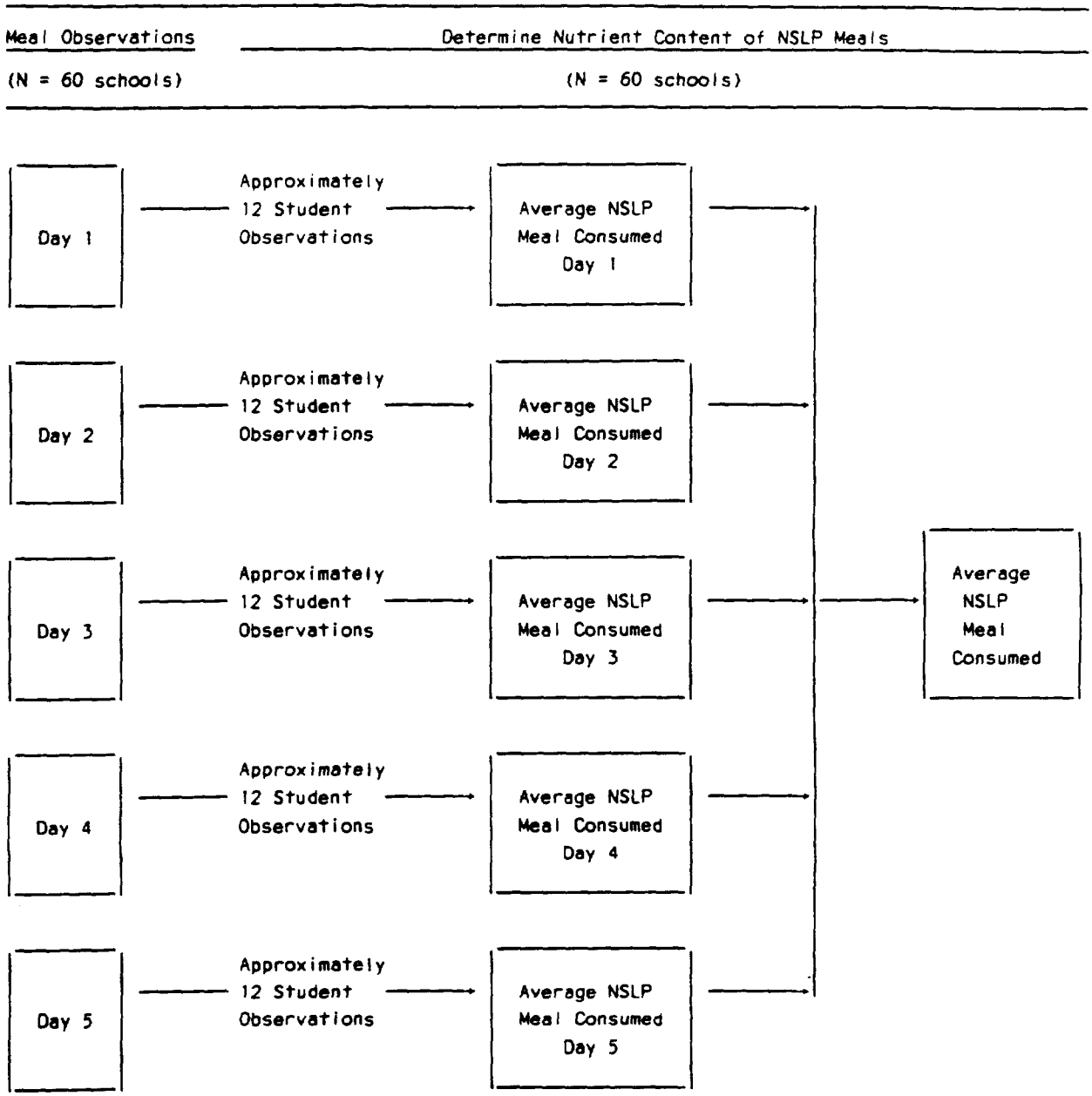
- Total energy (calories)
- Protein (gm)
- Total Fat (gm)
- Saturated Fat (gm)
- Cholesterol (mg)
- Total Carbohydrate (gm)
- Vitamin A (mcg RE)
- Vitamin C (mg)
- Thiamin (mg)
- Riboflavin (mg)
- Niacin (mg N.E.)
- Vitamin B_6 (mg)
- Calcium (mg)
- Phosphorus (mg)
- Magnesium (mg)
- Iron (mg)
- Sodium (mg)

This list includes nutrients traditionally examined in studies of school nutrition programs (including NESNP-I),1/ nutrients

1/Wellisch, J.B., S.D. Hanes, L.A. Jordan, K. M. Maurer, and J.A. Vermeersch. The National Evaluation of School Nutrition Programs: Final Report. Santa Monica, CA: Systems Development Corporation, 1983.

Exhibit VII.5

Determination of the Nutrient Content of the Average NSLP Meal Consumed



that past research has demonstrated may be low in the school-age population in general or in particular subgroups, as well as the nutrients that are of greatest concern in the current U.S. diet, e.g., fats, cholesterol and sodium.

In creating analytic files for the nutrient analysis, each individual food item was linked to an appropriate item in the nutrient data base through use of a seven-digit code. The nutrient content of each serving of food, as offered, selected or consumed, was then computed using the observed portion size.

For items prepared "from scratch," nutrient content was determined by separately coding and analyzing detailed recipes that were collected in each school. The Recipe Analysis Program (RAP), a micro-computer-based software package developed jointly by USDA-HNIS and the University of Texas Health Science Center, School of Public Health, and based on the Survey Data Base, was utilized for these specialized analyses.

Comparing Nutrient Content to Recommended Standards. Once the nutrient content of the average NSLP meal was determined at all three levels (offered, selected and consumed), three different measures were computed to assess overall nutritional adequacy and quality. These included: percent contribution to Recommended Dietary Allowances (RDAs), indices of nutritional quality (INQs), and comparison to the Dietary Guidelines for Americans. Each is described below.

Percent Contribution to Recommended Dietary Allowances (RDAs). The RDAs are the accepted standard for determining the relative adequacy of mean nutrient intakes of population groups. As mentioned previously, regulations state that NSLP meals should, over time, provide approximately one-third of childrens' daily nutrient needs.

The most recent (1989) Recommended Dietary Allowances (see Appendix F) were used as reference standards. The proportion of the RDA provided in NSLP meals was evaluated for those nutrients that have established RDAs: protein, vitamin A, vitamin C, thiamin, riboflavin, niacin, vitamin B_6, calcium, phosphorus, magnesium and iron. Total energy content (calories) was also evaluated.

The nutrient content of the average NSLP meal as offered, selected and consumed was examined separately for elementary and middle/secondary schools. The average NSLP meal in each type of school was compared to appropriate age- and sex-group RDA values.1/ Thus, the nutrient content of the average NSLP meal

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1/The RDAs define separate, and frequently different, nutrient needs for 4-6 year olds, 7-10 year olds, 11-14 year old males, 11-14 year old females, 15-18 year old males and 15-18 year old females.

in elementary schools was compared to the RDAs for 4-6 year olds (grades K-1), 7-10 year olds (grades 1-5), 11-14 year old males and 11-14 year old females (grades 5, 6 and 7). Meals in middle/secondary schools were compared to RDAs for 11-14 year old males and 11-14 year old females (grades 7-9), and 15-18 year old males and 15-18 year old females (grades 10-12). The results of these analyses are interpreted in light of the stated program goal of providing approximately one-third of the RDAs for children in each age/grade group.

An important caveat must be made for interpretation of the results of these RDA comparisons for NSLP meals as **selected** and **consumed.** The data from this study describe meals consumed by "average students" as opposed to students whose age and sex are specifically known. It is not possible, therefore, to identify with certainty specific groups of students who may be selecting or consuming meals that provide less than one-third of the RDA for a given nutrient. This issue is discussed further in the section that reports findings from the meals selected analysis.

Indices of Nutritional Quality (INQs). The INQ was used to measure the nutrient density or nutritional quality of the average NSLP meal. The INQ measures the nutrient contribution of a meal relative to its caloric content.1/ The degree to which nutrients and calories are balanced provides a useful measure of the overall quality of NSLP meals.

An INQ was computed for each nutrient within each RDA age/sex group using the following equation:

$$\text{INQ} = \frac{\text{\% RDA for nutrient in average NSLP meal}}{\text{\% RDA for total calories in average NSLP meal.}}$$

An INQ of 1.0 or greater indicates that the meal is high in nutritional quality, i.e., calories and nutrients are optimally balanced. INQs of less than 1.0 indicate that the RDA for the nutrient of interest would not be met unless the RDA for calories was exceeded. INQ scores provide additional insight into how RDA standards are met, i.e., whether the total nutrient content of the average meal is influenced more by the total quantity or nutritional quality of foods included.

Dietary Guidelines for Americans. Several important aspects of nutritional quality are not addressed in the RDA standards. Specifically, the RDAs do not address fat (both quantity and type), cholesterol and sodium content. The excess consumption of these dietary constituents, which is characteristic of the typical U.S. diet, has been a major focus of public health initiatives in recent years. Approximately one dozen agencies

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1/Sorenson, W., Wyse, B., Wittwer, A. and Hansen, R.G. (1976). "An Index of Nutritional Quality for a Balanced Diet." Journal of the American Dietetic Association, 68: 236-242.

have issued dietary recommendations encouraging moderate intake of these nutrients. Prime among these is the Dietary Guidelines for Americans (hereafter referred to as the Dietary Guidelines) issued jointly by USDA and the U.S. Department of Health and Human Services (DHHS). The Dietary Guidelines, originally issued in 1980, were revised in 1985, and were again reissued in October, 1990. Exhibit VII.6 summarizes the most recent recommendations.

Currently, Child Nutrition Programs are not required to address the Dietary Guidelines in planning menus for the NSLP or SBP. However, USDA has encouraged School Nutrition Programs to consider them. The Menu Planning Guide for School Food Service highlights the Dietary Guidelines recommendations and encourages menu planners to keep fat, sugar and salt at a "moderate level."1/ The Department has recently identified incorporation of the Dietary Guidelines principles as a goal that school districts should be striving to meet by the year 2000.

In this report, the Dietary Guidelines are used as reference standards for evaluating the percent of calories from total fat and saturated fat in NSLP meals. The Dietary Guidelines do not include specific recommendations for sodium or cholesterol intake. The National Research Council (NRC) recommends that adults and children limit salt intake to 6 grams per day (equivalent to 2400 mg. of sodium), and dietary cholesterol intake to less than 300 mg. per day.2/ The NRC guidelines for sodium and cholesterol intake are not endorsed by USDA, but are presented in this report as reference points to assist the reader in interpreting the data.

Food-Level Analysis

Unit of Analysis. The primary objective of the food-level analysis is to provide FNS with up-to-date information on the types of food offered to, selected by, and consumed by children participating the the NSLP. In order to obtain this information it is necessary to focus not on the 5-day "average" NSLP meal used in the nutrient content analysis, but on each of the specific meals offered and, in the case of data on food selection and consumption, on each of the individual student-level observations.

1/Menu Planning Guide for School Food Service. U.S. Department of Agriculture, Food and Nutrition Service, 1983.

2/National Research Council, Food and Nutrition Board, Committee on Diet and Health. Diet and Health. Washington, D.C.: National Academy Press, 1989.

Exhibit VII.6

Dietary Guidelines for Americans[1]

- Eat a variety of foods
- Maintain healthy weight
- Choose a diet low in fat, saturated fat, and cholesterol

  GOALS:

  fat - 30 percent or less of calories

  saturated fat - less than 10 percent of calories
- Choose a diet with plenty of vegetables, fruits and grain products

  GOALS:

  vegetables - 3 or more servings

  fruits - 2 or more servings

  grains - 6 or more servings
- Use sugar only in moderation
- Use salt and sodium only in moderation
- If you drink alcoholic beverages, do so in moderation

[1] Issued by the U.S. Departments of Agriculture and Health and Human Services, 1990.

Thus, for research questions related to foods included in NSLP meals as offered, the unit of analysis is the NSLP meal offered in each school on each day of observation (n=297).1/ For research issues related to food selection decisions and food consumption patterns, the unit of analysis is the NSLP meal as selected or consumed by each of the students observed.2/

Data Aggregation. The meal observation data base includes approximately 1,400 unique food items, far too many for meaningful analysis. Consequently, a taxonomy was developed that aggregated food items into 6 major categories (based on the major NSLP meal component categories), 14 subgroups, and 101 specific types of food. The major categories and subgroups are listed in Exhibit VII.7. The complete taxonomy is provided in Exhibit ET-VII.1.

General Analytic Approach

Analysis of both the nutrient content and foodlevel data employs simple descriptive statistics, i.e., means, proportions, frequency distributions and the like. Statistics are calculated and presented separately for each of the three types of NSLP meals--offered, selected and consumed. Data are also stratified by school type (elementary and middle/secondary) and, in some cases, by SFA type (exemplary and typical).

T-tests or chi-square tests have been performed to test the statistical significance of selected differences between SFAs (exemplary and typical) and schools (elementary and middle/secondary). T-tests have also been used to evaluate the significance of differences in nutrient content between meals offered and meals selected, and between meals selected and meals consumed. Because of the large number of t-tests calculated in this analysis, discussions are limited to variables that exhibit a difference that is statistically significant at the .01 level rather than the more liberal .05 level. This approach compensates for the possibility of finding large numbers of comparisons significant by chance alone.

The decision to conduct significance tests at the .01 rather than the .05 level of significance was a compromise decision which offers the advantages of being more conservative than the

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1/Lunch was observed for 5 consecutive days in 60 schools, for a total of 300 meals offered. During analysis, three of these meals were excluded because of poor data quality, yielding 297 meals offered.

2/On each day of observation, food selection was observed for approximately 60 children, and plate waste (food consumption) was observed for approximately 12 children. A total of 16,571 student meals were available for inclusion in the meals selected analysis; 3,470 student meals were included in the meals consumed analysis.

Exhibit VII.7

Major Categories and Subgroups in Food Group Taxonomy[1]

Major Categories	Subgroups
Milk	None
Fruit	Fresh Fruit Canned Fruit Fruit Juice Dried Fruit Other
Vegetables[2]	Raw Vegetables Cooked Vegetables Potatoes Beans, Legumes Soups
Breads/Bread Alternates[3]	None
Entrees	Meat, Poultry or Fish[4] Meat and Bread Combinations - Sandwiches and burgers - Other Meat, Bread, Vegetable Combinations Meat, Vegetable Combinations
Desserts[5]	None

[1]Complete taxonomy listed in Exhibit ET-VII.1.

[2]Includes vegetables offered as a separate item, i.e., not included in combination items such as chef salad, tacos, taco salad, etc.

[3]Includes breads/bread alternates offered as a separate item, i.e., not included in combination items such as sandwiches, burgers, pizza, pasta dishes, etc.

[4]Meat, poultry, fish offered separately, i.e., not in combination items.

[5]Includes only desserts that were considered part of the reimburseable meal (i.e., not a la carte desserts) but did not contribute to satisfying any of the NSLP meal pattern requirements.

.05 level and being simple to understand and interpret. An alternative, and technically more appropriate, approach would be to apply Bonferroni's inequality, which requires no assumption of independence to establish the significance level for each set of estimates. If k estimates are tested simultaneously, the overall significance level of .05 can be preserved by testing each of the k estimates at the .05/k level. In this way, the probability of getting one or more significant outcomes by chance alone can be no greater than .05.

For many of the nutrient content comparisons, 17 estimates are tested simultaneously, implying that an individual significance level of .05/17 (= .003) should be applied to each comparison. Because the 17 nutrients being examined are correlated, it is possible to adjust Bonferroni's inequality such that the individual tests for mean differences could reliably be done using a significance level of .05/12 (= .004) rather than .05/17 (= .003). However, either of these approaches has the disadvantage of being difficult for the average reader to understand, and leaves open the possibility of being more conservative than is necessary in a study which is basically exploratory in nature. This study is less concerned with testing specific hypotheses than with describing characteristics of the Child Nutrition Programs. Therefore, for the purposes of this study it was decided that use of the .01 significance level is acceptable given that is is reasonably conservative, is readily understandable, and will not result in ignoring findings which are of interest to FNS.

NSLP MEALS OFFERED

This section presents data on the food and nutrient composition of the average NSLP meal offered in elementary and middle/secondary schools in SY 1989-90.1/ First, the overall nutritional adequacy of the average meal offered in each type of school is evaluated in light of age- and sex-appropriate RDA standards and the program goal of providing approximately one-third of the RDA. Second, INQ scores are examined. Third, the content of the average NSLP meal offered is compared to the Dietary Guidelines recommendations. Finally, food-level analyses are presented and findings related to the types of food offered in NSLP meals are discussed.

Nutrient Content

As Exhibit VII.8 indicates, the average NSLP meal offered in middle/secondary schools in SY 1989-90 included more calories and more of all nutrients than the average NSLP meal offered in elementary schools. Differences are statistically significant

1/For reasons that will be explained later in this chapter, data for exemplary and typical SFAs have been pooled for all analyses.

Exhibit VII.8

Mean Calorie and Nutrient Content
of the Average NSLP Meal Offered
in Elementary and Middle/Secondary Schools
(SY 1989-90)

	Elementary (n=40)	Middle/Secondary (n=20)	All Schools (n=60)
Calories	721*	808	750
Protein (gm)	30*	34	31
Total Fat (gm)	31	34	32
Saturated Fat (gm)	12	14	12
Cholesterol (mg)	84	99	89
Total Carbohydrate (gm)	84	94	87
Vitamin A (mcg R.E.)	324	369	339
Vitamin C (mg)	25*	36	28
Thiamin (mg)	.49*	.56	.51
Riboflavin (mg)	.76*	.86	.80
Niacin (mg N.E.)	6.09	6.77	6.32
Vitamin B_6 (mg)	.47*	.54	.49
Calcium (mg)	476*	538	497
Phosphorus (mg)	561*	627	583
Magnesium (mg)	97	106	100
Iron (mg)	4.14*	4.79	4.36
Sodium (mg)	1,102*	1,341	1,182

*Difference between elementary and middle/secondary schools is statistically significant at the .01 level.

Data Source: On-Site Meal Observations.

for all nutrients except fat (total and saturated), carbohydrate, cholesterol, vitamin A, niacin and magnesium. These results are not surprising given that the NSLP meal pattern suggests use of increased food portions for older children in recognition of their increased nutrient needs (see Exhibit VII.1).

Percent Contribution to RDAs

When compared to the RDAs for the groups of children that typically attend each type of school, the average NSLP meal offered in both elementary and middle/secondary schools provided the program goal of approximately one-third of the RDA in almost all cases.1/ The average lunch offered in elementary schools supplied one-third or more of the RDA for all nutrients for 4-6 year olds and 7-10 year olds (Exhibit VII.9). It also supplied approximately one-third or more of the RDAs for older students with the following exceptions:

- calories (29 percent) and vitamin B_6 (28 percent) for 11-14 year old males; and
- iron (28 percent) for 11-14 year old females.

It is important to point out that these data are based on the average portions of food offered in each of the schools observed. (Portions were weighed as part of the observation protocol.) Program guidelines encourage schools to provide larger portions or additional servings to older students whose nutritional needs are greater. The importance of this policy is reinforced by the finding that the only nutrient shortfalls in the average meal offered occur for older students.

The average NSLP lunch offered in middle/secondary schools met the program goal of providing approximately one-third of the RDA for most nutrients for the appropriate age and sex groups (Exhibit VII.10). The only appreciable exceptions were:

- calories (27 percent), vitamin B_6 (27 percent), and magnesium (26 percent) for 15-18 year old males.

As will be seen later in this chapter, the average meal offered in middle/secondary schools includes larger food portions than the average meal offered in elementary schools, in keeping with program recommendations. Yet, potential nutrient shortfalls of the average meal offered were again noted for the oldest students in the school. This finding suggests that schools need to be conscious of the differential needs of the student populations they serve, and maintain adequate flexibility when serving meals so that older students can indeed receive the

1/Any nutrient supplied at 32 percent or more of the RDA was judged to meet the goal of providing approximately 33 percent of the RDA.

Exhibit VII.9

Percentage of Recommended Dietary Allowances Provided in the Average NSLP Meal Offered in Elementary Schools (SY 1989-90)

	Nutrients In Meal Offered	Students 4-6 years		Students 7-10 years		Male Students 11-14 years		Female Students 11-14 years	
		One-Third Daily RDA	Percent Daily RDA	One-Third Daily RDA	Percent Daily RDA	One-Third Daily RDA	Percent Daily RDA	One-Third Daily RDA	Percent Daily RDA
Calories	721	600	40%	667	36%	833	29%	733	33%
Protein (gm)	30	8	125	9	108	15	67	15	65
Vitamin A (mcg R.E.)	324	167	65	233	46	333	32	267	40
Vitamin C (mg)	25	15	55	15	55	17	49	17	49
Thiamin (mg)	.49	.30	54	.33	49	.43	37	.36	44
Riboflavin (mg)	.76	.37	69	.40	63	.50	51	.43	59
Niacin (mg N.E.)	6.09	4.00	51	4.33	47	5.67	36	5.00	41
Vitamin B_6 (mg)	.47	.37	43	.47	34	.57	28	.47	34
Calcium (mg)	476	267	60	267	60	400	40	400	40
Phosphorus (mg)	561	267	70	267	70	400	47	400	47
Magnesium (mg)	97	40	81	57	57	90	36	93	35
Iron (mg)	4.14	3.33	41	3.33	41	4.00	34	5.00	28

NOTE: NSLP goal is to provide approximately one-third of the RDA for all age groups.

Data Source: On-Site Meal Observations.

Exhibit VII.10

Percentage of Recommended Dietary Allowances Provided in the Average NSLP Meal Offered in Middle/Secondary Schools (SY 1989-90)

	Nutrients in Meal Offered	Male Students 11-14 years		Female Students 11-14 years		Male Students 15-18 years		Female Students 15-18 years	
		One-Third Daily RDA	Percent Daily RDA	One-Third Daily RDA	Percent Daily RDA	One-Third Daily RDA	Percent Daily RDA	One-Third Daily RDA	Percent Daily RDA
Calories	808	833	32%	733	37%	1000	27%	733	37%
Protein (gm)	34	15	76	15	74	20	58	15	78
Vitamin A (mcg R.E.)	369	333	37	267	46	333	37	267	46
Vitamin C (mg)	36	17	71	17	71	20	59	20	59
Thiamin (mg)	.56	.43	43	.37	51	.50	37	.37	51
Riboflavin (mg)	.86	.50	58	.43	66	.60	48	.43	66
Niacin (mg N.E.)	6.77	5.66	40	5.00	45	6.67	34	5.00	45
Vitamin B_6 (mg)	.54	.57	32	.47	38	.67	27	.50	36
Calcium (mg)	538	400	45	400	45	400	45	400	45
Phosphorus (mg)	627	400	52	400	52	400	52	400	52
Magnesium (mg)	106	90	39	93	38	133	26	100	35
Iron (mg)	4.79	4.00	40	5.00	32	4.00	40	5.00	32

NOTE: NSLP goal is to provide approximately one-third of the RDA for all age groups.

Data Source: On-Site Meal Observations.

additional food they need to meet the program goal of approximately one-third of the RDA.

Indices of Nutritional Quality (INQs)

Exhibits VII.11 and VII.12 present INQs for the average meal offered in elementary and middle/secondary schools, respectively. INQ scores for the average meals offered in both types of schools met or exceeded 1.0 for almost all nutrients examined. This finding demonstrates that, overall, NSLP meals planned in accordance with program meal component guidelines were high in nutritional quality and balanced across a number of key nutrients.

The average lunch offered in elementary schools provided more calories than needed by the youngest students (40 percent and 36 percent of the RDA for 4-6 year olds and 7-10 year olds, respectively) and fewer calories than needed by the oldest male students (29 percent of the RDA.) (See Exhibit VII.9). The mix of foods, however, was well-selected and nutrient dense. The data suggest that the portions of food actually served to students could be adjusted slightly to meet their differing caloric needs, and both groups would still receive one-third of the RDA for most nutrients examined in this study. The only exceptions are vitamin B_6 for 7-10 year olds and 11-14 year old males, and iron for 11-14 year-old females. The low iron density of the average NSLP meal relative to the iron requirement for 11-14 year-old females was the most significant shortfall. The INQ score of 0.85 indicates that the target RDA for iron could not be met for this group of students with the average NSLP meal offered in elementary schools unless the RDA for calories was exceeded.

The average lunch offered in middle/secondary schools provided slightly less calories than needed by male students and more calories than needed by female students (see Exhibit VII.10). The foods offered, however, were high enough in nutrient density that portions for each group of students could be adjusted slightly to better meet caloric needs without compromising total nutrient intake. The average lunch offered was somewhat low in nutrient density for vitamin B_6, magnesium and iron for some student groups (see Exhibit VII.12). Again, the most significant shortfall was iron density for female students. The INQ scores of 0.86 indicate that the average NSLP meal offered in middle/secondary schools met the RDA target for iron for these students (see Exhibit VII.10) only because it exceeded the RDA for calories.

Comparison to Dietary Guidelines for Americans

Exhibit VII.13 summarizes the mean proportion of calories provided by fat (both total fat and saturated fat), carbohydrate, and protein, as well as the mean cholesterol and sodium content of the average NSLP meal offered in elementary and middle/secondary schools.

Exhibit VII.11

Indices of Nutritional Quality (INQs) for the
Average NSLP Meal Offered in Elementary Schools
(SY 1989-90)

	INQs for Students 4-6 Years	INQs for Students 7-10 Years	INQs for Male Students 11-14 Years	INQs for Female Students 11-14 Years
Protein (gm)	3.12	3.00	2.31	1.97
Vitamin A (mcg R.E.)	1.62	1.28	1.10	1.21
Vitamin C (mg)	1.38	1.53	1.69	1.48
Thiamin (mg)	1.35	1.36	1.28	1.33
Riboflavin (mg)	1.72	1.75	1.76	1.79
Niacin (mg N.E.)	1.28	1.31	1.24	1.24
Vitamin B_6 (mg)	1.08	0.94	0.97	1.03
Calcium (mg)	1.50	1.67	1.38	1.21
Phosphorus (mg)	1.75	1.94	1.62	1.42
Magnesium (mg)	2.02	1.58	1.34	1.06
Iron (mg)	1.02	1.14	1.17	0.85

NOTE: An INQ of 1.0 or more indicates that the meal is of high nutritional quality. INQs below 1.0 indicate that the meal will not provide 100% of the target level RDA (one-third) unless the target RDA for calories is exceeded.

Data Source: On-Site Meal Observations.

Exhibit VII.12

Indices of Nutritional Quality (INQs) for
the Average NSLP Meal Offered in Middle/Secondary Schools
(SY 1989-90)

	INQs for Male Students 11-14 Years	INQs for Female Students 11-14 Years	INQs for Male Students 15-18 Years	INQs for Female Students 15-18 Years
Protein (gm)	2.38	2.00	2.14	2.11
Vitamin A (mcg R.E.)	1.16	1.24	1.37	1.24
Vitamin C (mg)	2.22	1.92	2.19	1.59
Thiamin (mg)	1.34	1.38	1.37	1.38
Riboflavin (mg)	1.81	1.78	1.78	1.78
Niacin (mg N.E.)	1.25	1.22	1.26	1.22
Vitamin B_6 (mg)	1.00	1.03	1.00	0.97
Calcium (mg)	1.41	1.22	1.67	1.22
Phosphorus (mg)	1.63	1.41	1.93	1.41
Magnesium (mg)	1.22	1.03	0.96	0.95
Iron (mg)	1.25	0.86	1.48	0.86

NOTE: An INQ of 1.0 or more indicates that the meal is of high nutritional quality. INQs below 1.0 indicate that the meal will not provide 100% of the target level RDA (one-third) unless the target RDA for calories is exceeded.

Data Source: On-Site Meal Observations.

Exhibit VII.13

Macronutrient, Cholesterol and Sodium Content of the Average NSLP Meal Offered in Elementary and Middle/Secondary Schools Compared to the Dietary Guidelines for Americans (SY 1989-90)

	USDA/DHHS Dietary Guidelines for Americans	Elementary (n=40)	Middle/ Secondary (n=20)	All Schools (n=60)
Percent Calories from Fat	≤ 30.0	38.4	38.0	38.2
Percent Calories from Saturated Fat	< 10.0	14.8	15.0	14.9
Percent Calories from Carbohydrate	55.0-65.0[1]	46.4	46.4	46.4
Percent Calories from Protein	5.0-15.0[1]	16.8	17.0	16.9
Mean Cholesterol (mg)	n.q.[2]	91	99	89
Mean Sodium (mg)	n.q.[2]	1,102*	1,341	1,182

[1]The USDA/DHHS Dietary Guidelines do not provide specific recommendations for the proportion of calories from carbohydrates and protein. RDAs for protein for school age children range from 5 to 8 percent of total calories. In general the average protein intake considerably exceeds the RDA. The National Research Council (NRC) report Diet and Health recommends maintaining total protein at levels lower than twice the RDA for all age groups and that the intake of carbohydrates be more than 55% of total calories. To achieve the recommended levels of calories from fat, carbohydrate and protein content would need to be in these ranges.

[2]Not quantified. There is no established Recommended Dietary Allowance or Estimated Safe and Adequate Intake for cholesterol or sodium. The Dietary Guidelines for Americans recommend choosing a diet low in cholesterol and use of salt and sodium only in moderation. The National Research Council (NRC) report Diet and Health recommends that adults and children limit salt intake to 6 grams per day, equal to 2400 mg. of sodium, and dietary cholesterol intake to less than 300 mg. per day.

*Difference between elementary and middle/secondary schools is statistically significant at the .01 level.

Data Source: On-Site Meal Observations.

As the exhibit illustrates, in SY 1989-90, the mean proportion of calories from total fat and saturated fat in the average NSLP meal offered in both elementary and middle/secondary schools exceeded the Dietary Guidelines recommendations. In both elementary and middle/ secondary schools, the average NSLP meal as offered derived 38 percent of its calories from fat and about 15 percent of its calories from saturated fat. The Dietary Guidelines recommend levels of 30 percent (or less) and less than 10 percent, respectively.

The mean sodium content of NSLP meals offered in elementary schools was approximately 1100 mg., and the mean for middle/secondary schools was 1341 mg. These values are high in comparison to recommendations from the National Research Council's Diet and Health report.1/ The cholesterol content of the average meal offered in both schools compared favorably with NRC recommendations.

Frequency distributions of the fat, cholesterol and sodium content of the average meals offered in the individual schools are presented in Exhibit VII.14. Only two percent of elementary schools and five percent of middle/secondary schools offered meals whose fat content was within the range recommended by the Dietary Guidelines. In this sample, the average NSLP meal offered in 35 percent of the schools provided more than 40 percent of its calories from fat. This occurred most often in elementary schools, where 43 percent of the average NSLP meals had fat contents in this range.

None of the schools examined in this study offered lunches that, on average, provided 800 mg. of sodium or less.2/ Sodium content was highest in middle/secondary schools, where the average NSLP meal served in 85 percent of the schools contained more than 1200 mg. of sodium. In contrast, the average NSLP meal offered in 70 percent of the elementary schools contained less than 1200 (but more than 800) mg. of sodium.

Food Level Analysis

Three issues are of interest in examining the specific foods offered in NSLP meals:

- How much choice is available to students, i.e., how often are they offered more than one choice within a major meal component category?

1/The NRC guidelines are not endorsed by USDA. They are presented in this report solely as reference points to assist the reader in interpreting the data.

2/800 mg. is equivalent to one-third of the NRC recommended daily maximum of 2400 mg. sodium.

Exhibit VII.14

Frequency Distribution of the Level of Fat, Cholesterol, and Sodium Provided in the Average NSLP Meal Offered in Elementary and Middle/Secondary Schools (SY 1989-90)

	Percent of Schools		
	Elementary (n=40)	Middle/ Secondary (n=20)	All Schools (n=60)
Percent Calories from Fat			
≤ 30 percent (D.G. Goal)[1]	2%	5%	3%
31-35 percent	25	20	23
36-38 percent	22	30	25
39-40 percent	8	25	13
> 40 percent	43	20	35
Percent Calories from Saturated Fat			
< 10 percent (D.G. Goal)[1]	0	0	0
11-13 percent	32	20	28
14-16 percent	45	60	50
> 17 percent	22	20	22
Cholesterol (mg)[2]			
≤ 75 mg	35	10	27
76-100 mg	43	55	47
101-150 mg	22	30	25
151-200 mg	0	5	2
Sodium (mg)[2],*			
≤ 800 mg	0	0	0
801-1,000 mg	30	5	22
1,001-1,200 mg	40	10	30
1,201-1,500 mg	27	65	40
> 1,500 mg	2	20	8

[1]Level of intake recommended in the USDA/DHHS Dietary Guidelines for Americans.

[2]The Dietary Guidelines for Americans recommend choosing a diety low in cholesterol and use of salt and sodium only in moderation. The National Research Council (NRC) report Diet and Health recommends that adults and children limit salt intake to 6 grams per day (equal to 2400 mg. of sodium) and dietary cholesterol intake to less than 300 mg. per day.

*Chi-square test of differences between elementary and middle/secondary schools is statistically significant at the .01 level.

Data Source: On-Site Meal Observations.

- What specific foods are being offered to students in the NSLP?

- Are there differences between elementary and middle/secondary schools in the number, type or amount of foods offered?

Each of these issues is addressed, in turn, in the following sections.

Availability of Choices Within Meal Component Categories. Exhibit VII.15 summarizes the number of options offered, within meal component category, in meals observed in the selected elementary and middle/ secondary schools. As the exhibit illustrates, in SY 1989-90 middle/secondary schools offered a significantly greater number of choices for all meal component categories, except bread/bread alternates and desserts, than elementary schools. At both levels, students had the greatest number of options when it came to choosing milk. Only five percent of the meals offered in elementary schools and none of the meals offered in middle/secondary schools limited the availability of milk to one particular type. Most of the meals offered three or more kinds of milk (66 percent of meals in elementary schools and 81 percent of meals in middle/secondary schools).

Most schools also offered students a choice of fruits or juices. Fifty-four percent of the meals offered in elementary schools included two or more types of fruit or juice, as did 73 percent of the meals offered in middle/secondary schools. Over one-third of the meals offered in elementary schools and one-quarter of those offered in middle/secondary schools, however, included only one type of fruit or juice.1/

Students tended to have fewer options in choosing vegetables. Forty-eight percent of the meals offered in elementary schools and 35 percent of middle/secondary school meals either offered vegetables only as part of a combination item, i.e., pasta with sauce, salad bars, chef salad, etc, or offered only one vegetable choice.

Of all the major meal components, students had the fewest options when it came to selecting a main entree. This is particularly true for elementary schools, where fifty percent of the meals offered included only one entree. In middle/ secondary schools, on the other hand, only 29 percent of the meals were limited to one entree. Thirty-one percent of meals offered in these schools offered two entrees, 10 percent offered three entrees, and 29 percent included four or more entrees.

1/ Students in these schools may still have had some choice in selecting an NSLP meal, since a fully compliant meal can include two vegetables rather than a fruit and a vegetable.

Exhibit VII.15

Number of Options Available Within Meal Component Categories
In Lunches Offered in Elementary and Middle/Secondary Schools
(SY 1989-90)

Meal Component Category/ Number of Options	Percent of NSLP Meals Offered		
	Elementary (n=198)	Middle/ Secondary (n=99)	All Schools (n=297)
Milk*			
1 option only	5%	0%	3%
2 options	29	18	26
3 options	40	46	42
4 or more options	26	35	29
Fruit*			
None offered	7	6%	6
1 option only	39	20	33
2 options	25	17	23
3 options	15	23	18
4 or more options	14	33	20
Vegetables*			
1 option only	39	21	33
2 options	33	25	31
3 options	14	25	18
4 or more options	5	14	8
Combination items only[1]	9	14	11
Entrees*			
1 option only	50	29	42
2 options	36	31	35
3 options	10	10	10
4 options	1	11	4
5 or more options	3	18	8
Bread/Bread Alternates			
1 option only	43	49	45
2 or more options	6	12	8
Combination items only[2]	51	38	47
Desserts[3]			
None offered	69	71	69
1 option only	27	23	26
2 or more options	4	6	5

[1]No separate vegetable selections were offered. All vegetable options were part of a combination entree item such as chef salad, pasta with tomato sauce, tacos, etc.

[2]No separate breads/bread alternate selections were offered. All bread/bread alternate options were part of a combination entree item such as a sandwich or pizza.

[3]Includes only desserts that were considered part of a reimbursable NSLP meal. A la carte desserts are not included.

*Chi-square test of difference between elementary and middle/secondary schools is statistically significant at the .01 level.

Data Source: On-Site Meal Observations.

Across all schools, almost one-half of the meals did not include a separate bread or bread alternate offering. This finding is not as surprising as it may seem, since the majority of entrees offered were combination items that included a bread/bread alternate component -- like hamburgers (the bun), sandwiches (the bread) and pizza (the crust) (See discussion below, and Exhibit VII.16.)

Finally, dessert items that do not contribute to meeting the meal pattern requirement were included in reimbursable meals only about 31 percent of the time. When dessert was offered, it was generally limited to one item.

Specific Food Items Offered. Exhibit VII.16 summarizes data on the specific food items offered in the 297 NSLP meals observed in SY 1989-90. Estimates for elementary and middle/secondary schools were compared, and significant differences between the two types of schools are identified.

The types of milk offered most frequently in both elementary and middle/secondary schools were, in descending order, low-fat (unflavored) milk, flavored milk, and whole milk. Skim milk was offered in only 32 percent of the elementary school meals and 39 percent of the middle/secondary school meals.

A wide variety of fruits were offered to students in both types of schools, with canned fruits offered more often than fresh fruits.1/ Dried fruits were offered infrequently. The specific types of fruit offered in elementary and middle/secondary schools were fairly comparable: fresh apples, fresh oranges, canned fruit cocktail and canned applesauce were among the most common choices. Canned pineapple, canned peaches and berries (other than strawberries) were offered more frequently in middle/secondary schools.

The types of vegetables offered were also fairly comparable in both schools. Raw vegetables, i.e., salads or sliced raw vegetables, were offered more frequently than any other type of vegetable, particularly in middle/secondary schools. A significantly larger proportion of meals in middle/secondary schools offered raw vegetables, and lettuce salads in particular, than elementary school meals. Potatoes, usually french fries and tater tots, were also offered frequently in both elementary and middle/secondary meals. The proportion of meals that offered these items, however, was significantly greater for middle/secondary schools (61 percent vs. 43 percent). Other types of cooked vegetables were offered in 45 percent of elementary school meals and 39 percent of middle/secondary school meals; corn and mixed vegetables were

1/The timing of meal observations (in Mid-March) may have limited the number of SFAs offering fresh fruit.

Exhibit VII.16

Foods Offered in NSLP Meals in Elementary and Middle/Secondary Schools (SY 1989-90)

Meal Component/Food Item	Percent of Meals Offering Each Item: Elementary Schools (n=198)	Middle/Secondary Schools (n=99)
MILK	100%	100%
Whole Milk	71	83
Lowfat Milk	93	99
Skim Milk	32	39
Flavored Milk	90	96
FRUIT	93	94
FRESH FRUIT	44	49
Apple	23	24
Banana	7	9
Cantaloupe	1	1
Grapefruit	1	0
Grapes	4	1
Orange	21	32
Pear	3	8
Watermelon	1	2
Fruit Salad	1	3
CANNED FRUIT	58	70
Applesauce	18	23
Apricots	2	2
Fruit Cocktail	23	24
Peaches	12*	28
Pears	16	19
Pineapple	9*	23
Plums	1	2
Strawberries	1	0
Other Berries	1*	5
FRUIT JUICE	34	48
DRIED FRUIT	3	7
OTHER FRUIT CHOICES	19	20
Crisps, Cobblers	9	9
Gelatins (made with fruit juice or fruit) Juice Bars, Misc.	11	11

-continued-

Exhibit VII.16
(continued)

Meal Component/Food Item	Percent of Meals Offering Each Item: Elementary Schools (n=198)	Middle/Secondary Schools (n=99)
VEGETABLES[1]	91%	86%
RAW VEGETABLES	49*	67
Lettuce, Salad	36*	58
Other Raw Vegetables	13	13
Cole Slaw, Miscellaneous Salads	5	8
COOKED VEGETABLES	45	39
Corn	17	13
Green Beans	10	8
Broccoli	6	7
Cabbage	1	2
Peas	5	2
Carrots	1	2
Mixed Vegetables	13	10
Onion Rings	1	2
Spinach, Greens	2	0
Miscellaneous Vegetables	3	3
POTATOES	43*	61
French Fries, Tater Tots, etc.	35*	54
Other Potatoes	9	15
BEANS, LEGUMES	12	6
SOUPS	1*	8
BREADS/BREAD ALTERNATES[2]	49	62
Bagels	1	0
Bisquits/Croissants	4	3
Bread, Toast	8	10
Cornbread	8	3
Crackers	4*	15
Rolls	18	29
Sweet Buns	2	3
Fruit Muffins/Breads	1	0
Tortillas, Taco Shells	1	0
Rice	7	7
Pasta, Noodles	1	2
Pancakes, Waffles	2	1

-continued-

Exhibit VII.16
(continued)

Meal Component/Food Item	Percent of Meals Offering Each Item: Elementary Schools (n=198)	Middle/Secondary Schools (n=99)
ENTREE	100%	100%
MEAT/POULTRY/FISH[3]	33	35
Beef - Roast, Ribs	1	2
Breaded Fried Steak	2	2
Broiled Steak	1	1
Meatloaf	1	1
Pork Chop	0	2
Baked, BBQ Chicken	5	6
Chicken Nuggets, Patty	6	6
Chicken or Turkey Croquettes	1	3
Roast Turkey	1	1
Fish Nuggets, Sticks	2	0
Fried Clams	0	1
Breaded Fish Portion	4	7
Bacon, Sausage	4	2
Chili (Mostly Meat)	6	5
Cold Meat, Cheese Plate	4	1
MEAT AND BREAD COMBINATIONS	74	78
BURGERS AND SANDWICHES	57	67
Hamburger, Cheeseburger	9*	39
Steak, Roast Beef Sandwich	3	5
Sloppy Joe, BBQ Beef	6	4
Hot Dogs, Corn Dogs	19	24
Fried Chicken Sandwich	10	14
Fried Fish Sandwich	4	6
Coldcut Sandwich, Submarine Sandwiches	7*	19
Ham & Cheese Sandwich	4*	18
Grilled Cheese Sandwich	4	5
Tuna Salad Sandwich	2	6
Egg Salad Sandwich	0	1
Peanut Butter & Jelly Sandwich	13	7
Turkey Sandwich	2	6
OTHER MEAT AND BREAD COMBINATIONS	33	39
Pizza	22	27
Burrito, Enchilada	4	10
Taco, Nacho (without vegetables)	6	8
Pot Pies	1	1
French Toast	1	1
Macaroni & Cheese	3	3
Beef & Noodles, Goulash, Miscellaneous	1	2

-continued-

Exhibit VII.16
(continued)

Meal Component/Food Item	Percent of Meals Offering Each Item: Elementary Schools (n=198)	Percent of Meals Offering Each Item: Middle/Secondary Schools (n=99)
MEAT, GRAIN, VEGETABLE COMBINATIONS[4]	15%*	24%
Spaghetti with Meat Sauce	6	8
Lasasna, Ravioli, etc.	3	7
Taco, Taco Salad	7	3
Salad Bars[5]	0*	6
MEAT, VEGETABLE COMBINATIONS	8	15
Chef Salad[6]	6	10
Salad Bar[6]	1	3
Potato Bar	1	1
Stir Fry, Miscellaneous Items	1	1
DESSERTS[7]	31	29
Pies, Tarts	3	0
Cookies	14	12
Cakes, Brownies	7	11
Gelatins (without added fruit or juice)	1	5
Ice Cream, Puddings	9	5

[1]Includes vegetables offered as a separate item, i.e., not included in combination items such as chef salad, tacos, taco salad, etc.

[2]Includes breads/bread alternates offered as a separate item, i.e., not included in combination items such as sandwiches, burgers, pizza, pasta dishes, etc.

[3]Meat, poultry and fish items offered separately, i.e., not in combination items.

[4]SFAs considered these items to meet part or all of the vegetable/fruit meal pattern requirement.

[5]These salads included a roll, crackers, pasta salad or other item that met a portion or all of the bread/bread alternate requirement.

[6]These salads did not include bread/bread alternate components.

[7]Includes foods served in reimburseable meals that were not creditable toward any component in the NSLP meal pattern.

*Difference between elementary and middle/secondary schools is statistically significant at the .01 level.

Data Source: On-Site Meal Observations.

the specific vegetables offered most often. Finally, a small percentage of middle/secondary school meals offered vegetable soups (8 percent); only 1 percent of the elementary school meals included soup.

As mentioned in the preceding section, a substantial number of the meals offered in both elementary and middle/secondary schools did not offer a bread or bread alternate as a separate choice (i.e., not included in an entree item). When a separate bread/bread alternate choice was offered, dinner rolls were most common. Fifteen percent of the middle/secondary school meals offered crackers, compared to only 4 percent of elementary school meals.

Entrees offered in NSLP meals most often included two or more meal component categories. Meat, poultry or fish were offered as separate entree items in only about a third of all meals, and few specific items (i.e., roast beef, baked chicken, etc.) were offered in more than 5 percent of all the meals observed. The most common type of entree offered was a meat/bread combination item. Approximately three-quarters of the meals offered in both types of schools included a meat/bread combination entree. These were most often burgers or sandwiches (57 percent of meals offered in elementary schools and 67 percent of middle/secondary school meals).

The specific meat/bread combination items offered most frequently in elementary schools were pizza (22 percent of all meals offered), hot dogs and corn dogs (19 percent), and peanut butter and jelly sandwiches (13 percent). In middle/secondary schools, hamburgers and cheeseburgers were the most common entree (39 percent of all meals), followed by pizza (27 percent), and hot dogs and corn dogs (24 percent). Hamburgers and cheeseburgers were offered in middle/secondary school meals about four times more often than elementary school meals (39 percent vs. nine percent). In addition, a significantly greater number of middle/secondary school meals offered cold cut sandwiches and ham and cheese sandwiches.

Combination entree items that contributed to meal pattern requirements for meat, bread/bread alternates and vegetables were also offered in meals observed in both elementary and middle/secondary schools. Such entree choices, particularly combination salad bars, were offered in a significantly larger proportion of middle/secondary school meals than elementary school meals. Meat and vegetable combination entrees (i.e., no bread/bread alternate component) were also encountered, but were much less common (8 percent of meals in elementary schools and 15 percent in middle/secondary schools).

Finally, as previously mentioned, desserts were infrequently included as part of the reimbursable meal. When offered, cookies were the most common type of dessert in both elementary and middle/secondary school meals.

Portion Sizes. NSLP meal pattern guidelines suggest, but do not require, that schools serve larger portions to children in grades 7 - 12, in recognition of their increased calorie and nutrient needs. Data from this study indicate that, for the most part, meals offered in middle/secondary schools do include larger portions than meals offered in elementary schools. Exhibit VII.17 summarizes average portions for each type of school for each meal component. The average serving in middle/secondary schools is significantly larger for milk (some middle/secondary schools offered 16 oz. containers of milk in addition to the traditional 8 oz. container), fruit, vegetables and meat/bread combination entrees.

NSLP MEALS SELECTED

This section discusses the food and nutrient composition of the average NSLP meal as selected by participating students in SY 1989-90. Nutrient content, percent contribution to RDAs, and INQ scores are examined, along with comparisons to Dietary Guidelines recommendations. Differences are examined at two levels:

- differences between the average meal offered and the average meal selected within each school type; and

- differences between elementary schools and middle/secondary schools in the nutritional characteristics of the average NSLP meal selected.1/

The food-level analyses reported in this section describe the food selection patterns of students in elementary and middle/secondary schools, including the number of items selected, the NSLP meal components included, and the most common combinations of meal components. Detailed data on the percentage of students selecting various types of food offered in NSLP meals is also presented. Finally, the availability of a la carte items in the sampled elementary and middle/secondary schools is described.2/

1/As mentioned in the introduction to this chapter, the analysis does not assess potential nutritional differences between meals selected in schools with and without the OVS option. This is due to the fact that only twelve of the sampled elementary schools had not implemented the OVS option in SY 1989-90, providing too small a sample for meaningful comparative analyses.

2/The calculated nutrient content of average NSLP meals as selected does not include calories or nutrients from a la carte foods. Data reflect nutritional characteristics of reimbursable NSLP foods only.

Exhibit VII.17

Average Portion Sizes of Foods Offered in NSLP Meals in Elementary and Middle/Secondary Schools (SY 1989-90)

Meal Component Category	Average Portion Size (in grams)		
	Elementary	Middle/Secondary	All Schools
Milk	240 gm.*	254 gm.	245 gm.
Fruit	96*	113	104
Vegetables	52*	69	59
Entrees			
- Meat, Poultry, Fish	95	109	100
- Meat/Bread Combination Entrees	114*	136	126
Breads/Bread Alternates	45	47	46
Desserts	58	63	60

*Difference between elementary and middle/secondary schools is statistically significant at the .01 level.

Note: Average serving sizes for meat-bread-vegetable combination entrees and meat-vegetable combination entrees could not be reliably calculated given the limited number of individual observations available and/or the dissimilarity of items included in these categories (e.g., lasagna and chef salad).

Data Source: On-Site Meal Observations.

Nutrient Content

As Exhibit VII.18 illustrates, the nutrient content of the average NSLP meal selected in both elementary and middle/secondary schools did not differ significantly from the nutrient content of the average meal offered. This finding suggests that, overall, students are selecting meals that include all or most of the components contained in the pattern NSLP meal.1/

As expected, the average meal selected in middle/secondary schools contained significantly greater amounts of calories and all nutrients, except carbohydrate and vitamin A, than the average meal selected in elementary schools. While this pattern is not surprising given the previously described differences in the meals offered in both schools, it is interesting to note that the average meal selected in middle/secondary schools contains significantly greater amounts of total fat, saturated fat, cholesterol, niacin and magnesium than the average meal selected in elementary schools, despite the fact that the average meals offered in the two schools did not differ from one another in these measures. This finding suggests differences in food selection patterns between students in elementary schools and students in middle/secondary schools. The food-level analyses discussed in a subsequent section of this chapter provides some potential explanations for these differences.

Percent Contribution to RDAs

Evaluating the percent RDA contribution of the average NSLP meal as selected by students is, for a number of reasons, not a straightforward exercise. First of all, the nutrient content of the average meal selected, as defined in this study, represents the nutrient content of the meal selected by the average student in each school. That is, this measure represents an aggregated estimate of nutrient content based on the meals selected by a random sample of students in each school. This sample included children of different ages and sexes, both of which are important factors in judging nutritional adequacy.2/

1/The instances where the nutrient content of the average meal selected is slightly greater than the average meal offered can be attributed to student selection patterns (i.e., more students selected the higher calorie options) and the fact that some students took multiple servings of some items.

2/Due to both the pace and purposefully unobtrusive design of the data collection, information was not collected on the ages of the children observed. While childrens' sex was recorded, data are of limited usefulness in this analysis without accompanying information on age. FNS is pursuing further analysis of NSLP/SBP meals through the Special Nutrition Dietary Assessment Study which will collect sufficient information to make appropriate age and sex comparisons.

Exhibit VII.18

Mean Calorie and Nutrient Content of the Average NSLP Meal Offered and Selected in Elementary and Middle/Secondary Schools (SY 1989-90)

	Elementary Schools (n=40)			Middle/Secondary Schools (n=20)		
	Offered	Selected	Difference (%) (Sel vs. Off)	Offered	Selected	Difference (%) (Sel vs. Off)
Calories	721*	707*	-1.9%	808	836	+3.5%
Protein (gm)	30*	29*	-3.3	34	35	+2.9
Total Fat (gm)	31	28*	-9.7	34	36	+5.9
Saturated Fat (gm)	12	11*	-8.3	14	14	0.0
Cholesterol (mg)	84	79*	-6.0	99	94	-5.0
Total Carbohydrate (gm)	84	87	+3.6	94	96	+2.1
Vitamin A (mcg R.E.)	324	299	-7.7	369	328	-11.1
Vitamin C (mg)	25*	24*	-4.0	36	31	13.9
Thiamin (mg)	.49*	.46*	-6.1	.56	.56	0.0
Riboflavin (mg)	.76*	.73*	-4.0	.86	.80	-7.0
Niacin (mg N.E.)	6.09	5.87*	-3.8	6.77	7.42	+9.6
Vitamin B_6 (mg)	.47*	.46*	-2.1	.54	.55	+1.8
Calcium (mg)	476*	450*	-5.5	538	497	-7.6
Phosphorus (mg)	561*	544*	-3.0	627	625	-0.3
Magnesium (mg)	97	93*	-4.1	106	104	-1.9
Iron (mg)	4.14*	4.21*	+1.7	4.79	5.20	+10.6
Sodium (mg)	1,102*	1,120*	+1.6	1,341	1,422	+6.0

*Difference between elementary and middle/secondary schools is statistically significant at the .01 level.

Note: None of the differences between the nutrient content of the average meal offered and the average meal selected, within school type, are statistically significant.

Data Source: On-Site Meal Observations.

Thus, an important issue for this analysis is how to evaluate the nutritional adequacy of the average meal selected given the fact that the RDA standards are age- and sex-specific. After considerable discussion with FNS, it was decided to compare the nutrient content of the average meal selected to the RDA standards for each of the age groups that typically attend each school, as was done in the preceding analysis of meals offered. Interpretation of the results of these comparisons must be approached cautiously, however. The reader is advised to utilize the following logic when interpreting these data.

It is useful to begin by defining a target range for each nutrient for the selected meal. The target range is determined by the RDA values for age-sex groups included in the school population. For example, children 4-6 years old have an RDA of 1,800 calories, so the target calorie level for the NLSP lunch for this group is 600 calories. One-third of the RDA for male students 11-14 years old is 833 calories. Because these are the elementary school groups with the lowest and highest RDA values, respectively, then the target range for the average elementary meal can be defined as 600-833 calories.

The average meal selected in elementary schools provided 707 calories (see Exhibit VII.19), which is within the target range. This of course does not prove that every student selected a meal that contained one-third of the appropriate RDA for his or her age and sex. Indeed, if every student selected the same 707-calorie meal, those with higher RDAs would be falling short of one-third, while those with lower RDAs would be exceeding the target. Thus, the target range is only a rough approximation. A perfect pattern of meal selection, in which every student chooses a meal equal to one-third of the RDA, would produce an average that falls within the target range. But a number of imperfect patterns could also yield averages within the target range.

If the average meal selected falls outside the target range, the interpretation is more clear-cut. An average that lies below the low end of the target range indicates a significant deficiency. In the example above, an average of less than 600 calories would mean that most students are not selecting enough calories. An average exceeding the high end of the target range (above 833 calories, in the example) indicates that most students are selecting more than the target amount of the RDA.

Exhibit VII.19 presents comparisons of the nutrient content of the average NSLP meal as selected in elementary schools in SY 1989-90 with each of the appropriate RDA standards. Keeping in mind the interpretative guidelines outlined above, we can see that all nutrients fall within or above the target range. The average NSLP meal as selected was above the target range for protein, vitamin C, thiamin, riboflavin, niacin, calcium, phosphorus, and magnesium. The average meal selected was within the target range for calories, vitamin A, vitamin B6, and iron.

Exhibit VII.19

Percentage of Recommended Dietary Allowances Provided in the Average NSLP Meal as Selected in Elementary Schools (SY 1989-90)

		Students 4-6 years		Students 7-10 years		Male Students 11-14 years		Female Students 11-14 years	
	Nutrients in Meal Selected	One-Third Daily RDA	Percent Daily RDA	One-Third Daily RDA	Percent Daily RDA	One-Third Daily RDA	Percent Daily RDA	One-Third Daily RDA	Percent Daily RDA
Calories	707	600	39%	667	35%	833	28%	733	32%
Protein (gm)	29	8	121	9	104	15	64	15	63
Vitamin A (mcg R.E.)	299	167	60	233	43	333	30	267	37
Vitamin C (mg)	24	15	53	15	53	17	47	17	47
Thiamin (mg)	.46	.30	51	.33	46	.43	36	.37	42
Riboflavin (mg)	.73	.37	66	.40	61	.50	49	.43	56
Niacin (mg N.E.)	5.87	4.00	49	4.33	45	5.66	35	5.00	39
Vitamin B_6 (mg)	.46	.37	42	.47	33	.57	27	.47	33
Calcium (mg)	450	267	56	267	56	400	37	400	37
Phosphorus (mg)	544	267	68	267	68	400	45	400	45
Magnesium (mg)	93	40	77	57	55	90	34	93	33
Iron (mg)	4.21	3.33	42	3.33	42	4.00	35	5.00	28

NOTE: NSLP goal is to provide approximately one-third of the RDA for all age groups. Percentages in this table are based on the nutrient content of the meal selected by the average student in each school. No age- or sex-specific data were collected.

Data Source: On-Site Meal Observations.

The exhibit shows several instances in which the average meal selected provided less than one-third of the RDA for a particular nutrient for a particular group. For example, the average meal as selected had only 28 percent of the RDA for calories for males aged 11-14. If males aged 11-14 actually selected "average" meals, these meals would not provide the targeted level of calories. But the available data do not indicate how the meals selected by any particular age-sex group differed from the average.

Exhibit VII.20 presents data on the percent RDA contribution of the average NSLP meal selected in middle/secondary schools in SY 1989-90. The average NSLP meal as selected was above or within the target range for calories and all nutrients. The nutrient content of the average NSLP meal selected exceeded the target for protein, vitamin C, thiamin, riboflavin, niacin, calcium, phosphorus and iron. It was within the target range for calories, vitamin A, vitamin B_6 and magnesium.

In a few cases, the average meal selected provided less than one-third of the RDA for a particular nutrient. If these students (15-18 year old males) indeed consumed the "average" meal, then they would not receive one-third of the RDA for these nutrients. In the absence of actual data on how particular age- and sex-groups selected NSLP meals, however, it is not possible to determine how the specific meals selected by these students might differ from the "average" NSLP meal.

Indices of Nutritional Quality (INQs)

INQ scores for the average NSLP meal selected in elementary and middle/secondary schools are presented in Exhibits VII.21 and VII. 22, respectively. Because these measures are based on RDA standards the aforementioned caveats about data interpretation still apply. That is, these data represent the nutrient density of meals selected by average students. Because data on students' age and sex were not available, we can not say with certainty that any particular age/sex group would, in fact, select meals comparable to the average meals considered in this analysis.

The nutrient density of the average meal as selected in both elementary and middle/secondary schools was very similar to the nutrient density of the average meals offered (see Exhibits VII.11 and VII.12). This suggests that meals selected by students varied little from those that were offered to them. INQs for vitamin B_6 and magnesium fell for some age/sex groups, but still closely approximated the optimal score of 1.0.

Iron density for female students remained the only appreciable problem in both schools. INQ scores for iron for the average meal as selected were consistently higher than for the average meal offered (0.88 vs. 0.85 for elementary schools and 0.92 vs. 0.86 for middle/secondary schools). This suggests that students who omitted one or more of the NSLP components tended to include

Exhibit VII.20

Percentage of Recommended Dietary Allowances Provided in the Average NSLP Meal as Selected in Middle/Secondary Schools (SY 1989-90)

	Nutrients in Meal Selected	Male Students 11-14 years		Female Students 11-14 years		Male Students 15-18 years		Female Students 15-18 years	
		One-Third Daily RDA	Percent Daily RDA	One-Third Daily RDA	Percent Daily RDA	One-Third Daily RDA	Percent Daily RDA	One-Third Daily RDA	Percent Daily RDA
Calories	836	833	33%	733	38%	1000	28%	733	38%
Protein (gm)	35	15	77	15	76	20	59	15	80
Vitamin A (mcg R.E.)	328	333	33	267	41	333	32	267	41
Vitamin C (mg)	31	17	63	17	63	20	52	20	52
Thiamin (mg)	.56	.43	43	.37	51	.50	37	.37	51
Riboflavin (mg)	.80	.50	54	.43	62	.60	45	.43	62
Niacin (mg N.E.)	7.42	5.66	44	5.00	49	6.67	37	5.00	49
Vitamin B_6 (mg)	.55	.57	32	.47	39	.67	27	.50	37
Calcium (mg)	497	400	41	400	41	400	41	400	41
Phosphorus (mg)	625	400	52	400	52	400	52	400	52
Magnesium (mg)	104	90	39	93	37	133	26	100	35
Iron (mg)	5.20	4.00	43	5.00	35	4.00	43	5.00	35

NOTE: NSLP goal is to provide approximately one-third of the RDA for all age groups. Percentages in this table are based on the nutrient content of the meal selected by the average student in each school. No age- or sex-specific data were collected.

Data Source: On-Site Meal Observations.

Exhibit VII.21

Indices of Nutritional Quality (INQs) for
the Average NSLP Meal Selected in Elementary Schools
(SY 1989-90)

	INQs for Students 4-6 Years	INQs for Students 7-10 Years	INQs for Male Students 11-14 Years	INQs for Female Students 11-14 Years
Protein (gm)	3.10	2.97	2.29	1.97
Vitamin A (mcg R.E.)	1.54	1.23	1.07	1.16
Vitamin C (mg)	1.36	1.51	1.68	1.47
Thiamin (mg)	1.31	1.31	1.29	1.31
Riboflavin (mg)	1.70	1.74	1.75	1.75
Niacin (mg N.E.)	1.26	1.29	1.25	1.22
Vitamin B_6 (mg)	1.10	0.94	0.96	1.03
Calcium (mg)	1.44	1.60	1.32	1.16
Phosphorus (mg)	1.74	1.94	1.61	1.41
Magnesium (mg)	1.97	1.57	1.21	1.03
Iron (mg)	1.08	1.20	1.25	0.88

NOTE: An INQ of 1.0 or more indicates that the meal is of high nutritional quality. INQs below 1.0 indicate that the meal will not provide 100% of the target level RDA (one-third) unless the target RDA for calories is exceeded.

Data Source: On-Site Meal Observations.

Exhibit VII.22

Indices of Nutritional Quality (INQs) for
the Average NSLP Meal Selected in Middle/Secondary Schools
(SY 1989-90)

	INQs for Male Students 11-14 Years	INQs for Female Students 11-14 Years	INQs for Male Students 15-18 Years	INQs for Female Students 15-18 Years
Protein (gm)	2.36	2.00	2.11	2.11
Vitamin A (mcg R.E.)	1.00	1.08	1.18	1.08
Vitamin C (mg)	1.91	1.66	1.86	1.37
Thiamin (mg)	1.30	1.34	1.32	1.34
Riboflavin (mg)	1.64	1.63	1.61	1.63
Niacin (mg N.E.)	1.33	1.29	1.32	1.29
Vitamin B_6 (mg)	0.97	1.03	0.96	0.97
Calcium (mg)	1.24	1.08	1.46	1.08
Phosphorus (mg)	1.58	1.37	1.86	1.37
Magnesium (mg)	1.18	0.97	0.93	0.92
Iron (mg)	1.30	0.92	1.54	0.92

NOTE: An INQ of 1.0 or more indicates that the meal is of high nutritional quality. INQs below 1.0 indicate that the meal will not provide 100% of the target level RDA (one-third) unless the target RDA for calories is exceeded.

Data Source: On-Site Meal Observations.

iron-rich food(s) and exclude other foods. Because age- and sex-specific data are not available, however, it is impossible to determine the iron density of the meals actually selected by the students with the greatest iron requirements (females 11 years old or older).

Comparison to Dietary Guidelines for Americans

In SY 1989-90, the average meal selected in both elementary and middle/secondary schools, like the average meal offered, exceeded the Dietary Guidelines recommendations for calories from total fat and saturated fat (Exhibit VII.23). The mean sodium content of the average meal selected in elementary schools was 1,120 mg., and the mean for middle/secondary schools was 1,422 mg. In comparison to the daily sodium intake recommended by the NRC, these values are elevated. Cholesterol levels in the average meal selected in both schools compared favorably with NRC recommendations.

In elementary schools the average meal selected was significantly lower in total fat calories and higher in carbohydrate calories than the average meal offered. The increased carbohydrate calories made the elementary school meal significantly different in relative carbohydrate content than the middle/secondary school meal. Although the average meal selected in elementary school was still high in fat and low in carbohydrate in comparison to the Dietary Guidelines recommendations, this change is certainly in a positive direction. It suggests that some children in elementary schools preferentially excluded foods high in total fat and may also have selected additional or larger servings of high carbohydrate foods, thereby contributing carbohydrate calories that diminish the overall contribution of calories from fat.

Exhibit VII.24 presents frequency distributions of the fat, saturated fat, cholesterol and sodium content of the average meal selected in elementary and middle/secondary schools. This exhibit further illustrates the fact that, while the average meals selected in both types of schools tended to be high in total fat and saturated fat, more elementary school meals met, or came close to meeting, the Dietary Guidelines recommendations.

Food-Level Analysis

Several issues are examined in this section:

- In the presence of the offer-vs-serve (OVS) option, how many of the five items included in the NSLP meal pattern do students select? Which items are refused (not selected) most often?
- Of the specific foods available in each meal component category, which do students select most often?
- How many schools offer a la carte items in the same serving line as NSLP meals? What food items are typically available on an a la carte basis?

Exhibit VII.23

Macronutrient, Cholesterol and Sodium Content of
the Average NSLP Meal Offered and Selected
in Elementary and Middle/Secondary Schools
Compared to the Dietary Guidelines for Americans
(SY 1989-90)

	USDA/DHHS Dietary Guidelines for Americans	Elementary Schools (n=40)			Middle/Secondary Schools (n=20)		
		Offered	Selected	Difference (%) (Sel vs. Off)	Offered	Selected	Difference (%) (Sel vs. Off)
Percent of Calories from Fat	≤30.0	38.4	36.0	-2.4%[+]	38.0	38.4	+0.4%
Percent of Calories from Saturated Fat	<10.0	14.8	14.2	-0.6	15.0	15.0	0.0
Percent Calories from Carbohydrate	55.0-65.0[1]	46.4	49.2[*]	+2.8[+]	46.4	46.0	-0.4
Percent Calories from Protein	5.0-15.0[1]	16.8	16.5	-0.3	17.0	16.9	-0.1
Mean Cholesterol (mg)	n.q.[2]	84	79[*]	-6.0	99	94	-5.0
Mean Sodium (mg)	n.q.[2]	1,102[*]	1,120[*]	+1.6	1,341	1,422	+6.0

[1]The USDA/DHHS Dietary Guidelines do not provide specific recommendations for the proportion of calories from carbohydrates and protein. RDAs for protein for school age children range from 5 to 8 percent of total calories. In general, the average protein intake considerably exceeds the RDA. The National Research Council (NRC) report Diet and Health recommends maintaining total protein levels lower than twice the RDA for all age groups and that the intake of carbohydrates be more than 55% of total calories. To achieve the recommended levels of calories from fat, carbohydrate and protein content would need to be in these ranges.

[2]Not quantified. There is no established Recommended Dietary Allowance or Estimated Safe and Adequate Intake for cholesterol or sodium. The Dietary Guidelines for Americans recommend choosing a diet low in cholesterol and use of salt and sodium only in moderation. The National Research Council (NRC) report Diet and Health recommends that adults and children limit salt intake to 6 grams per day, equal to 2400 mg of sodium, and dietary cholesterol intake to less than 300 mg per day.

[*]Difference between elementary and middle/secondary schools is statistically significant at the .01 level.

[+]Difference between meal as offered and meal as selected, within school type, is statistically significant at the .01 level.

Data Source: On-Site Meal Observations.

Exhibit VII.24

Frequency Distribution of the Level of Fat, Cholesterol and Sodium Provided in the Average NSLP Meal Selected in Elementary and Middle/Secondary Schools (SY 1989-90)

	Percent of Schools		
	Elementary (n=40)	Middle/ Secondary (n=20)	All Schools (n=60)
Percent Calories from Fat			
≤ 30 percent (D.G. Goal)[1]	10%	5%	8%
31-35 percent	27	5	20
36-38 percent	38	40	38
39-40 percent	15	30	20
> 40 percent	10	20	13
Percent Calories from Saturated Fat			
< 10 percent (D.G. Goal)[1]	0	0	0
11-13 percent	40	20	33
14-16 percent	48	60	52
> 16 percent	13	20	15
Cholesterol (mg)[2]			
≤ 75 mg	43	20	35
76-100 mg	45	45	45
101-150 mg	13	30	18
151-200 mg	0	5	2
Sodium (mg)[2],*			
≤ 800 mg	2	0	2
801-1,000 mg	18	5	13
1,001-1,200 mg	58	15	43
1,201-1,500 mg	20	50	30
> 1,500 mg	2	30	12

[1]Level of intake recommended in the USDA/DHHS Dietary Guidelines for Americans.

[2]The Dietary Guidelines for Americans recommends choosing a diet low in cholesterol and use of salt and sodium only in moderation. The National Research Council (NRC) report Diet and Health recommends that adults and children limit salt intake to 6 grams per day (equal to 2400 mg. of sodium) and dietary cholesterol intake to less than 300 mg. per day.

*Chi-square test of differences between elementary and middle/secondary schools is significant at the .01 level.

Data Source: On-Site Meal Observations.

- What proportion of children select one or more a la carte items, in addition to their NSLP meal, when a la carte is available?

Differences between elementary and middle/secondary schools are explored for each question.

Food Selection Patterns Under OVS. Data on utilization of the OVS option in elementary schools was collected during a pre-visit interview with the SFA manager. Based on SFA managers' reports, only three SFAs (six elementary schools) had not implemented the OVS option in SY 1989-90. As detailed in Appendix B, however, field staff often noted discrepancies between the official SFA policy and the behaviors of local SFA staff. Most often the discrepancy resulted in OVS schools functioning like non-OVS schools, i.e., students were served or encouraged to take all five NSLP meal components. Unfortunately, data that would have described local SFA behavior in regard to the OVS option was not systematically collected during on-site observations since the variable was included in the SFA manager interview. Therefore, in preparing to address the food selection research questions centering on OVS, a decision had to be made about whether to use the SFA managers' reports or the patterns observed in the actual food selection data in classifying a particular school for analytical purposes.

The latter approach was selected. The original meal observation data books were reviewed for all elementary schools and an OVS status was assigned. All six of the schools that were originally reported to be non-OVS remained as such; no evidence of non-compliant meals was noted in the meals selected in these schools.1/ In addition, elementary schools in three additional SFAs were classified as non-OVS schools for the purposes of these analyses because no evidence of student refusals was found in the data (i.e., all observations included all the same foods). Thus, for these analyses, a total of 12 elementary schools were considered "non-OVS" and 28 were considered "OVS".

To evaluate food selection patterns under the OVS option, two separate analyses were carried out in the subsample of schools that was determined to have had the OVS option available.2/

1/It is impossible to tell whether non-compliant meals were never actually selected by participating students in these schools, or whether the data collection protocol and the reported SFA policy caused field staff to exclude non-compliant meals from their observations because they were non-reimbursable under USDA guidelines.

2/This subsample actually represents a substantial portion of the full sample, since all middle/secondary schools (n = 20), and 28 of the 40 elementary schools are included.

First, meals selected by each of the students observed in these schools were examined to determine the number of meal components included; results are presented in Exhibit VII.25. The data indicate that, even under the OVS option, the majority of students in both types of schools selected meals that included all 5 of the NSLP meal components. Elementary school students were more likely to select meals of this size than middle/secondary school students. Relatively few students selected a reimbursable meal that contained only three of the five required components. Only six percent of elementary school students and ten percent of middle/secondary school students did so. These findings support the conclusions drawn in the previous discussion of nutrient content of meals selected.

To determine which of the five meal components students omitted when they did select a meal with fewer than five components, each individual student-level observation was inspected for presence or absence of the five NSLP meal components. This cross-check revealed that the meal component most frequently omitted is the second fruit and/or vegetable, particularly at the middle/secondary school level (Exhibit VII.26). Forty percent of middle/secondary school students included only one fruit or vegetable choice, as did 26 percent of the school students. Milk was the second most likely item to be omitted, however, it was omitted infrequently. Only five percent of the elementary school meals did not include milk, compared to 16 percent of middle/secondary school meals.

Specific Foods Included in NSLP Meals Selected by Students. Exhibit VII.27 presents data on the average percentage of student meals that included particular food items when they were offered.1/ Patterns for elementary and middle/secondary students were examined and the significance of observed differences were evaluated.

As Exhibit VII.27 shows, students in both types of schools most often selected flavored milk. As noted above, elementary school students were more likely to select milk than middle/secondary school students.

1/This analysis included all observations of student meals, i.e., meals in both OVS and non-OVS schools. Evaluation of the data revealed that inclusion of non-OVS schools did not substantially alter the data (e.g., reported percentages), and did not affect the statistical significance of any findings. Thus, the term "selected" is used here in the broadest sense to reflect the foods that were actually on a student's tray. Students may or may not have had a true option to "select" or reject the food because 1) the OVS option may not have been available, and 2) there may have been no alternative choice, e.g., only one entree was offered.

Exhibit VII.25

Number of NSLP Meal Components[1] Included in Lunches Selected in Elementary and Middle/Secondary Schools with the OVS Option (SY 1989-1990)

Number of Meal Components*	Percent of Lunches Selected		
	Elementary Schools[2] (n=7,906)	Middle/Secondary Schools (n=5,127)	All Schools (n=13,033)
3 components	6%	10%	7%
4 components	26	35	29
5 or more components	67	55	63

[1]Refers to specific foods, sometimes part of a combination item, considered to contribute to the NSLP meal pattern, rather than discrete food items. For example, a hamburger is considered as two meal components (meat and bread), spaghetti with meatballs and tomato sauce is considered to have three components (bread alternate, meat, vegetable).

[2]Includes only observations in subsample of elementary schools that had the OVS option available. (All middle/secondary schools have OVS.)

Note: Detail may not sum to 100 percent due to rounding.

*Chi-square test of differences between elementary and middle/secondary schools is statistically significant at the .01 level.

Data Source: On-Site Meal Observations.

Exhibit VII.26

Proportion of Lunches Selected in Elementary and Middle/Secondary Schools with the OVS Option that Included Various NSLP Meal Components

Meal Component Category	Percent of Lunches Including: Elementary Schools[1] (n=7,906)	Middle/ Secondary Schools (n=5,127)	All Schools (n=13,033)
Milk*	95%	84%	91%
Fruit and Vegetables*			
-1 F or V as a separate item	24	33	28
-1 F or V in a combination item	2	6	4
-2 or more F or V, separately and/or in combination items	70	56	65
Bread/Bread Altrnate[2]	96	96	96
Meat/Meat Alternate	99	99	99

[1] Includes only observations in subsample of elementary schools that had the OVS option available. (All middle/secondary schools have OVS.)

[2] Includes both breads/bread alternates selected as a separate item and those found in combination entrees.

*Chi-square test of difference between elementary and middle/secondary schools is statistically significant at the .01 level.

Data Source: On-Site Meal Observations

Exhibit VII.27

Foods Included in Meals Selected by Students
in Elementary and Middle/Secondary Schools
(SY 1989-90)

Meal Component/Food Item	Elementary Schools		Middle/Secondary Schools	
	Percent of Meals Offering (n=198)	Percent of Meals Including[1] (n=198)	Percent of Meals Offering (n=99)	Percent of Meals Including[1]
MILK	100%	95%*	100%	84%
Whole Milk	71	11	83	12
Lowfat Milk	93	16	99	14
Skim Milk	32	11	39	5
Flavored Milk	90	76*	96	61
FRUIT	93	84*	94	54
FRESH FRUIT	44	56*	49	24
Apple	23	47*	24	18
Banana	7	38	9	8
Cantaloupe	1	13	1	14
Grapefruit	1	8	0	NA
Grapes	4	60	1	12
Orange	21	38*	32	16
Pear	3	28	8	2
Watermelon	1	42*	2	10
Fruit Salad	1	28	3	41
CANNED FRUIT	58	66*	70	31
Applesauce	18	58*	23	23
Apricots	2	11	2	1
Fruit Cocktail	23	46*	24	15
Peaches	12*	40	28	16
Pears	16	43	19	19
Pineapple	9*	40	23	17
Plums	1	100++	2	9
Strawberries	1	54	0	NA
Other Berries	1*	27	5	15
FRUIT JUICE	34	38	48	37
DRIED FRUIT	3	32*	7	13
OTHER FRUIT CHOICES	19	63*	20	27
Crisps, Cobblers	9	59*	9	20
Gelatins (made with fruit juice or fruit) Juice Bars, Misc.	11	67*	11	33

-continued-

Exhibit VII.27
(continued)

Meal Component/Food Item	Elementary Schools: Percent of Meals Offering (n=198)	Elementary Schools: Percent of Meals Including[1]	Middle/Secondary Schools: Percent of Meals Offering (n=99)	Middle/Secondary Schools: Percent of Meals Including[1]
VEGETABLES[2]	91%	80%	86%	79%
RAW VEGETABLES	49*	52*	67	37
Lettuce, Salad	36*	45	58	36
Other Raw Vegetables	13	54*	13	18
Cole Slaw, Miscellaneous Salads	5	64	8	24
COOKED VEGETABLES	45	56*	39	31
Corn	17	63	13	44
Green Beans	10	46	8	18
Broccoli	6	18	7	23
Cabbage	1	75	2	1
Peas	5	62	2	20
Carrots	1	8	2	13
Mixed Vegetables	13	40	10	10
Onion Rings	1	81	2	66
Spinach, Greens	2	11	0	NA
Miscellaneous Vegetables	3	4	3	17
POTATOES	43*	80	61	72
French Fries, Tater Tots, etc.	35*	80	54	72
Other Potatoes	9	63	15	34
BEANS, LEGUMES	12	50	6	33
SOUPS	1*	74*	8	19
BREADS/BREAD ALTERNATES[3]	49	70*	62	49
Bagels	1	83	0	NA
Bisquits/Croissants	4	69	3	47
Bread, Toast	8	71	10	53
Cornbread	8	68	3	71
Crackers	4*	53	15	18
Rolls	18	62	29	47
Sweet Buns	2	88*	3	16
Fruit Muffins/Breads	1	98	0	NA
Tortillas, Taco Shells	1	2	0	NA
Rice	7	67	7	70
Pasta, Noodles	1	20	2	57
Pancakes, Waffles	2	98	1	97

Exhibit VII.27
(continued)

Meal Component/Food Item	Elementary Schools: Percent of Meals Offering (n=198)	Elementary Schools: Percent of Meals Including[1]	Middle/Secondary Schools: Percent of Meals Offering (n=99)	Middle/Secondary Schools: Percent of Meals Including[1]
ENTREES	100%	99%	100%	99%
MEAT/POULTRY/FISH[4]	33	76*	35	50
Beef - Roast, Ribs	1	55	2	37
Breaded Fried Steak	2	91*	2	2
Broiled Steak	1	40	1	47
Meatloaf	1	99++	1	78
Pork Chop	0	NA	2	31
Baked, BBQ Chicken	5	81	6	61
Chicken Nuggets, Patty	6	89	6	69
Chicken or Turkey Croquettes	1	100++	3	9
Roast Turkey	1	85	1	51
Fish Nuggets, Sticks	2	46	0	NA
Fried Clams	0	NA	1	52
Breaded Fish Portion	4	78*	7	33
Bacon, Sausage	4	73	2	61
Chili (Mostly Meat)	6	70	5	40
Cold Meat, Cheese Plate	4	16	1	3
MEAT AND BREAD COMBINATIONS	74	85	78	82
BURGERS AND SANDWICHES	57	66	67	59
Hamburger, Cheeseburger	9**	51	39	36
Steak, Roast Beef Sandwich	3	39	5	53
Sloppy Joe, BBQ Beef	6	54	4	43
Hot Dogs, Corn Dogs	19	50*	24	26
Fried Chicken Sandwich	10	70*	14	35
Fried Fish Sandwich	4	84*	6	24
Coldcut Sandwich, Sub Sandwich	7*	37	19	23
Ham & Cheese Sandwich	4*	46*	18	8
Grilled Cheese Sandwich	4	65	5	49
Tuna Salad Sandwich	2	22*	6	3
Egg Salad Sandwich	0	NA	1	0
Peanut Butter & Jelly Sandwich	13	7*	7	2
Turkey Sandwich	2	55	6	6
OTHER MEAT AND BREAD COMBINATIONS	33	77	39	66
Pizza	22	76*	27	54
Burrito, Enchilada	4	67*	10	29
Taco, Nacho	6	57	8	53
Pot Pies	1	19	1	37
French Toast	1	100++	1	100
Macaroni & Cheese	3	29	3	37
Beef & Noodles, Goulash, Miscellaneous	1	100++	2	84

-continued-

Exhibit VII.27
(continued)

Meal Component/Food Item	Elementary Schools: Percent of Meals Offering (n=198)	Elementary Schools: Percent of Meals Including[1]	Middle/Secondary Schools: Percent of Meals Offering (n=99)	Middle/Secondary Schools: Percent of Meals Including[1]
MEAT, GRAIN, VEGETABLE COMBINATIONS[5]	15%	83%	24%	66%
Spaghetti with Meat Sauce	6	92	8	81
Lasasna, Ravioli, Miscellaneous	3	69	7	23
Taco, Taco Salad	7	82	3	63
Salad Bars[6]	0*	NA	6	96
MEAT, VEGETABLE COMBINATIONS	8	30	15	40
Chef Salad[7]	6	17	10	16
Salad Bar[7]	1	70	3	80
Potato Bar	1	100++	1	100
Stir Fry, Miscellaneous	1	25	1	100
DESSERTS[8]	31	84*	29	64
Pies, Tarts	3	33	0	NA
Cookies	14	88*	12	64
Cakes, Brownies	7	78	11	50
Gelatins (without added fruit or juice)	1	37	5	13
Ice Cream, Puddings	9	60	5	59

[1]Percentages reflect the proportion of student meals that included each item (or category) when the food was available. Sample size not reported because it varies for every item in the table.

[2]Includes vegetables offered as a separate item, i.e., not included in combination items such as chef salad, tacos, taco salad, etc.

[3]Includes breads/bread alternates offered as a separate item, i.e., not included in combination items such as sandwiches, burgers, pizza, pasta dishes, etc.

[4]Meat, poultry and fish items offered separately, i.e., not in combination items.

[5]SFAs considered these items to meet either part or all of the vegetable/fruit meal pattern requirements.

[6]These salads included a roll, crackers, pasta salad or other item that met some or all of the bread/bread alternate requirement.

[7]These salads did not include bread/bread alternate components.

[8]Includes foods served in reimburseable meals that were not creditable toward any component in the NSLP meal pattern.

*Difference between elementary and middle/secondary schools or students is statistically significant at the .01 level.

++Percentage of elementary school student meals is based on only one meal where the OVS option was not available.

NA: Selection data not available because none of the schools offered this item.

Data Source: On-Site Meal Observations.

Elementary school students were also more likely to select fruit, juice or another item that met a portion of the NSLP meal requirement for fruits and vegetables than middle/secondary school students (84 percent vs. 54 percent). The specific items included most often in meals selected by elementary school students were, in descending order, canned fruit, fresh fruit, fruit juices and other items that contained fruit and/or juice (e.g., crisps, cobblers, juice bars, gelatins made with juice or fruit, etc.).1/ The most common items in middle/secondary school meals were canned fruit, fruit juices, and other items made with fruit and/or juice (e.g., crisps, cobblers, juice bars, gelatin made with fruit or juice, etc.).

Potatoes were the most common vegetable selected by both elementary and middle/secondary school students, followed by raw vegetables and other cooked vegetables. Elementary school students were more likely to include raw vegetables or cooked vegetables when these items were available.

The type of entree most commonly included in student meals in both elementary and middle/secondary schools was a meat/bread combination item. In elementary school meals the most common entrees were, in descending order, pizza, hot dogs and corn dogs, fried chicken sandwiches and hamburgers and cheeseburgers. In middle/secondary school meals, the entrees were the same but the frequency of inclusion was slightly different: pizza was most common, followed closely by hamburgers and cheeseburgers and then, much less frequently, hot dogs and corn dogs and fried chicken sandwiches.

Finally, when desserts were offered, elementary school students were more likely to include them than middle/secondary school students (84 percent vs. 64 percent). This finding may be related to the fact that middle secondary school students tend to have access to more a la carte dessert items than do elementary school students, as described later in this section.

To obtain a more complete picture of the characteristics of NSLP meals selected by participating students, a variable was created that reflected the specific types of food included in each student meal, using the major food taxonomy groupings. The results of this analysis are presented in Exhibit VII.28. More than 25 different meal component combinations were encountered, however, five specific combinations accounted for almost 60 percent of the meals overall. The most prevalent type of meal in elementary schools (31 percent of all meals) consisted of milk, two separate fruit and vegetable choices, and a meat/bread combination entree. Considering the foods most commonly offered

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1/Foods that were included most often were those that were offered most often and "selected" most often.

Exhibit VII.28

Most Common Meal Component Combinations in
NSLP Meals Selected in
Elementary and Middle/Secondary Schools
(SY 1989-90)

Meal Component Combinations*	Percent of Meals Including: Elementary Schools (n=11,444)	Middle/ Secondary Schools (n=5,127)	All Schools (n=16,571)
Milk, 2 Fruit and Vegetable Choices, Meat and Bread Combination Entree	31%	21%	28%
Milk, 1 Fruit and Vegetable Choice, Meat and Bread Combination Entree	11	22	14
Milk, 2 Fruit and Vegetable Choices, Bread/Bread Alternate, Meat, Poultry or Fish	9	6	8
Milk, 1 Fruit and Vegetable Choice, Bread/Bread Alternate, and Meat, Vegetable, Bread Combination Entree	6	5	6
Milk, 1 Fruit or Vegetable Choice, Bread/Bread Alternate, Meat, Poultry or Fish	5	4	5
Other Combinations	37	42	39

*Chi-square analysis of the difference between elementary and middle/secondary schools was statistically significnat at the .01 level.

Data Source: On-Site Meal Observations.

and selected in these schools, as described above, an example of an actual meal represented by this combination would be: flavored milk, canned fruit cocktail, french fries or potato puffs and a slice of pizza.

The most common type of meal in middle/secondary schools (22 percent of all meals) included milk, 1 fruit or vegetable choice, and a meat/bread combination entree. Given the foods most commonly offered and selected in these schools, this translates into flavored milk, french fries or potato puffs and either a slice of pizza or a hamburger or cheeseburger.

Availability of A La Carte Items. The final research issue addressed in this section is the availability of a la carte items. During on-site observations, field staff collected information on the types of a la carte items that were available in the same serving line as the reimbursable meals that were being observed. These data provide some insight into the prevalence of a la carte items in NSLP schools. The reader should bear in mind, however, that the data undoubtedly underestimate the full prevalence of a la carte items since a la carte items were frequently available elsewhere in the cafeteria or school.

As Exhibit VII.29 indicates, a la carte items were available in the same serving line as reimburseable meals in over half of the schools in the sample. A la carte items were especially prevalent in middle/secondary schools; 80 percent of middle/secondary schools had at least some a la carte items available, compared to 58 percent of elementary schools. (This difference was statistically significant.)

Most elementary schools offered either one or two types of a la carte items. Desserts were offered much more frequently than other items like chips, beverages and fruits and vegetables. None of the elementary schools offered entree items on an a la carte basis. (Exhibit ET-VII.2 provides a more detailed list of specific types of a la carte items that were available.)

Both the number and variety of a la carte items offered in middle/secondary schools was significantly greater than in elementary schools. Sixty-nine percent of middle/secondary schools offered three or more items; one-quarter had extensive a la carte service, offering beverages, chips and snacks, fruits and vegetables, entrees, desserts and other items. Dessert was, again, the category that was offered most frequently. A la carte entrees were available in 44 percent of middle/secondary schools that offered some a la carte service.

During meal observations, observors indicated whether the student selected for observation had taken any a la carte items.1/ Only 12 percent of the elementary school students and

1/The type of a la carte item was not recorded.

Exhibit VII.29

Availability of A la Carte Items at Lunch in Elementary and Middle/Secondary Schools (SY 1989-90)

	Percent of Schools	
	Elementary Schools (n=40)	Middle/Secondary Schools (n=20)
Any A la carte available?*		
Yes	58%	80%
No	42	20
Number of A la carte categories available[1],*		
1 category	39	19
2 categories	48	12
3 categories	9	12
4 categories	4	12
5 categories	0	19
6 categories	0	25
Categories of A la carte items available[1],*		
Beverages	22	69
Fruits and Vegetables	9	62
Entrees	0	44
Desserts	96	75
Chips, Pretzels, Snacks	30	62
Other[2]	22	62

[1]Percentages reflect schools that have a la carte items available.

[2]Included yogurt, muffins, soups, candy, and a variety of other items, none of which were offered in more than three schools.

*Chi-square test of differences between elementary and middle/secondary schools is statistically significant at the .01 level.

Data Source: On-Site Meal Observations.

22 percent of the middle/secondary school students that had a la carte items available included an a la carte selection in the meal that was observed.

NSLP MEALS CONSUMED

This portion of the analysis discusses the food and nutrient composition of the average NSLP meal as actually consumed by participating students. The nutrient content and percentage contribution to RDAs are examined along with INQ scores and the levels of fat, cholesterol and sodium. Nutritional differences are again examined at two levels:

- differences between the average meal selected and the average meal consumed, within school type; and
- differences between elementary and middle/secondary schools in the nutritional characteristics of the average meal consumed.

The food-level analysis included in this section deals with the issue of plate waste in the NSLP, i.e., what proportion of the foods selected are actually consumed, and which specific types of food generate the greatest amount of waste?

Nutrient Content

The mean nutrient content of the average meal as offered, selected and consumed in elementary and middle/secondary schools in SY 1989-90 is summarized in Exhibit VII.30. As the exhibit shows, the nutrient content of the average meal consumed was consistently lower than the nutrient content of the average meal selected in both elementary and middle/secondary schools. This pattern indicates that, in general, students did not consume all of the foods they selected.

The magnitude of the differences between the average meal selected and the average meal consumed was consistently greater for elementary schools. In elementary schools, the average meal consumed contains significantly less calories and lower concentrations of every nutrient than the average meal selected. On average, elementary school students wasted about 23 percent of the nutrients that were available in the meals they had selected. In middle/secondary schools, on the other hand, the average meal consumed was only about 9 percent lower in nutrient content than the average meal selected, and none of the individual differences were statistically significant. Clearly, elementary school students wasted a larger portion of their meal than did middle/secondary school students.

A comparison of the nutrient content of the average meal consumed in each type of school adds further credence to this conclusion. The average meal consumed in elementary schools contained significantly less calories and all nutrients than the average meal consumed in middle/secondary schools. This finding

Exhibit VII.30

Mean Calorie and Nutrient Content of the Average NSLP Meal Offered, Selected and Consumed in Elementary and Middle/Secondary Schools (SY 1989-90)

	Elementary Schools (n=40)				Middle/Secondary Schools (n=20)			
	Offered	Selected	Consumed	Difference (%) (Con vs. Sel)	Offered	Selected	Consumed	Difference (%) (Con vs. Sel)
Calories	721*	707*	544*	-23.0%+	808	836	755	-9.7%
Protein (gm)	30*	29*	22*	-24.1+	34	35	32	-8.6
Total Fat (gm)	31	28*	22*	-21.4+	34	36	32	-11.1
Saturated Fat (gm)	12	11*	9*	-18.2+	14	14	13	-7.1
Cholesterol (mg)	84	79*	61*	-22.8+	99	94	85	-9.6
Total Carbohydrate (gm)	84	87	66*	-24.1+	94	96	87	-9.4
Vitamin A (mcg R.E.)	324	299	215*	-28.1+	369	328	293	-10.7
Vitamin C (mg)	25*	24*	18*	-25.0+	36	31	30	-3.2
Thiamin (mg)	.49*	.46*	.35*	-23.9+	.56	.56	.51	-8.9
Riboflavin (mg)	.76*	.73*	.57*	-21.9+	.86	.80	.75	-6.2
Niacin (mg N.E.)	6.09	5.87*	4.50*	-23.3+	6.77	7.42	6.60	-11.0
Vitamin B_6 (mg)	.47*	.46*	.35*	-23.9+	.54	.55	.49	-10.9
Calcium (mg)	476*	450*	353*	-21.5+	538	497	468	-5.8
Phosphorus (mg)	561	544*	423*	-22.2+	627	625	575	-8.0
Magnesium (mg)	97	93*	70*	-24.7+	106	104	94	-9.6
Iron (mg)	4.14*	4.21*	3.17*	-24.7+	4.79	5.20	4.66	-10.4
Sodium (mg)	1,102*	1,120*	859*	-23.3+	1,341	1,422	1,290	-9.3

*Difference between elementary and middle secondary schools is statistically significant at the .01 level.

+Difference between nutrient content of the average meal selected and the average meal consumed, within school type, is statistically significant at the .01 level.

Data Source: On-Site Meal Observations.

is expected given the results described previously in the meals offered and meals selected analyses. However, differences for the average meal consumed were consistently larger than the differences for either the average meal offered or the average meal selected. For example, the average meal selected in elementary schools contained 14 percent fewer calories than the average meal selected in middle/ secondary schools. The average meal consumed in elementary schools, on the other hand, contained 39 percent fewer calories than the average meal consumed in middle/secondary schools.

Percent Contribution to RDAs

Exhibit VII.31 presents comparisons of the nutrient content of the average NSLP meal consumed in elementary schools with each of the age-appropriate RDA standards. The average lunch consumed by children in elementary schools exceeded the target nutrient ranges for protein, vitamin C, riboflavin and phosphorus, i.e., the average lunch consumed included levels of these nutrients that exceed approximately one-third of the daily needs of even the oldest elementary school students. The levels of vitamin A, thiamin, niacin, calcium and magnesium were within the target range. As the exhibit shows, older students would have to consume more than is included in the average NSLP meal in order to meet their needs for these nutrients. The available data do not indicate, however, how the meals consumed by any particular age/sex group may have differed from the average.

The average NSLP meal consumed in elementary schools was below the target range for calories, vitamin B_6 and iron. Thus, the average meal as consumed did not provide one-third of the RDA for calories and these nutrients for the majority of elementary school children. This finding is comparable to findings from other studies.

Exhibit VII.32 summarizes RDA comparisons for the average meal consumed in middle/secondary schools. The nutrient content of the average NSLP meal consumed in these schools exceeded the target range for protein, vitamin C, thiamin, riboflavin, niacin, calcium and phosphorus. It was within the target range for magnesium and iron, although the previous caveat about greater needs of older students applies here also.

The average NSLP meal consumed by middle/secondary students was below the target range for calories, vitamin A and vitamin B_6, and therefore did not meet the RDA goals for these nutrients for most middle/secondary school students. The findings for calories and vitamin B_6 are consistent with those noted for NSLP meals consumed in elementary schools and with other studies of NSLP meals. The apparent shortfall of vitamin A in NSLP meals as consumed has also been noted in previous studies.

Exhibit VII.31

Percentage of Recommended Dietary Allowances Provided in the Average NSLP Meal Consumed in Elementary Schools (SY 1989-90)

	Nutrients in Meal Consumed	Students 4-6 years		Students 7-10 years		Male Students 11-14 years		Female Students 11-14 years	
		One-Third Daily RDA	Percent Daily RDA	One-Third Daily RDA	Percent Daily RDA	One-Third Daily RDA	Percent Daily RDA	One-Third Daily RDA	Percent Daily RDA
Calories	544	600	30%	667	27%	833	22%	733	25%
Protein (gm)	22	8	93	9	80	15	50	15	49
Vitamin A (mcg R.E.)	215	167	43	233	31	333	22	267	27
Vitamin C (mg)	18	15	39	15	39	17	35	17	35
Thiamin (mg)	.35	.30	39	.33	35	.43	27	.37	32
Riboflavin (mg)	.57	.37	52	.40	47	.50	38	.43	44
Niacin (mg N.E.)	4.50	4.00	37	4.33	35	5.67	26	5	30
Vitamin B_6 (mg)	.35	.37	32	.47	25	.57	20	.47	25
Calcium (mg)	353	267	44	267	44	400	29	400	29
Phosphorus (mg)	423	267	53	267	53	400	35	400	35
Magnesium (mg)	70	40	58	57	41	90	26	93	25
Iron (mg)	3.17	3.33	32	3.33	32	4.00	26	5.00	21

NOTE: NSLP goal is to provide approximately one-third of the RDA for all age groups. Percentages in this table are based on the nutrient content of the meal consumed by the average student in each school. No age- or sex-specific data were collected.

Data Source: On-Site Meal Observations.

Exhibit VII.32

Percentage of Recommended Dietary Allowances Provided in the Average NSLP Meal Consumed in Middle/Secondary Schools (SY 1989-90)

	Nutrients in Meal Consumed	Male Students 11-14 years		Female Students 11-14 years		Male Students 15-18 years		Female Students 15-18 years	
		One-Third Daily RDA	Percent Daily RDA	One-Third Daily RDA	Percent Daily RDA	One-Third Daily RDA	Percent Daily RDA	One-Third Daily RDA	Percent Daily RDA
Calories	755	833	30%	733	34%	1000	25%	733	34%
Protein (gm)	32	15	71	15	69	20	54	15	72
Vitamin A (mcg R.E.)	293	333	29	267	37	333	29	267	37
Vitamin C (mg)	30	17	59	17	59	20	49	20	49
Thiamin (mg)	.51	.43	39	.37	46	.50	34	.37	46
Riboflavin (mg)	.75	.50	50	.43	58	.60	42	.43	58
Niacin (mg N.E.)	6.60	5.66	39	5.00	44	6.67	33	5.00	44
Vitamin B_6 (mg)	.49	.57	29	.47	35	.67	25	.50	33
Calcium (mg)	468	400	39	400	39	400	39	400	39
Phosphorus (mg)	575	400	48	400	48	400	48	400	48
Magnesium (mg)	94	90	35	93	34	133	24	100	31
Iron (mg)	4.66	4.00	39	5.00	31	4.00	39	5.00	31

NOTE: NSLP goal is to provide approximately one-third of the RDA for all age groups. Percentages in this table are based on the nutrient content of the meal consumed by the average student in each school. No age- or sex-specific data were collected.

Data Source: On-Site Meal Observations.

When viewed in concert, the results of the three analyses (i.e., NSLP meals as offered, selected and consumed) indicate that meals planned in accordance with program guidelines and offered to students were very successful in meeting the program goal of one-third of the RDA. Further, the nutrient content of meals selected by students were, with few exceptions, within the target range for calories and all nutrients. Significant nutritional shortfalls were few and arose only in the meals actually consumed by students, particularly at the elementary school level. Thus, the key to ensuring that students receive approximately one-third of their daily nutritional needs from an NSLP meal is to increase the likelihood that students will actually consume the meals they select. It is also important to ensure that the oldest students in each school have the ability to receive larger or additional portions of food.

Indices of Nutritional Quality (INQs)

Exhibits VII.33 and VII.34 present INQ scores for the average meal consumed by students in elementary and middle/secondary schools, respectively. Results are comparable to those described previously for the average meal selected. While the average NSLP meals consumed by students may have been low in total calories, the mix of foods included was high in nutritional quality and well-balanced. Iron density for older female students was, again, the most notable potential shortfall.

Comparison to Dietary Guidelines for Americans

Exhibit VII.35 summarizes the fat, cholesterol and sodium content of the average NSLP meal as offered, selected and consumed. In general, the conclusions drawn in previous analyses still hold: the average NSLP meal consumed in both elementary and middle/secondary schools exceeded the Dietary Guidelines recommendations for total fat and saturated fat. The average meal consumed in both types of schools was high in sodium, especially at the middle/secondary school level, and acceptable in cholesterol content, when compared to NRC Diet and Health guidelines. The average meal consumed in elementary schools came very close to meeting the NRC sodium goal, however, since this was due to food wastage, this finding is not entirely positive. Exhibit VII.36 presents frequency distributions for these nutrients.

Food Level Analysis

To investigate the amount of plate waste in the NSLP program, food selection and plate waste data for the sample of students selected for plate waste observation were utilized to compute a measure of the average percent consumption for each food item included in the food group taxonomy. The following method was used to determine the percent consumption for each food item selected by sampled children:

$$\frac{[\text{food selected (gm)} - \text{plate waste (gm)}]}{\text{food selected (gm)}} \times 100$$

An aggregate measure was also computed, using the total weight of all foods included in a meal and the total weight of the foods that were not consumed.

Exhibit VII.33

Indices of Nutritional Quality (INQs) for
the Average NSLP Meal Consumed in Elementary Schools
(SY 1989-90)

	INQs for Students 4-6 Years	INQs for Students 7-10 Years	INQs for Male Students 11-14 Years	INQs for Female Students 11-14 Years
Protein (gm)	3.10	2.96	2.27	1.96
Vitamin A (mcg R.E.)	1.43	1.15	1.00	1.08
Vitamin C (mg)	1.30	1.44	1.59	1.40
Thiamin (mg)	1.30	1.30	1.23	1.28
Riboflavin (mg)	1.73	1.74	1.73	1.76
Niacin (mg N.E.)	1.23	1.30	1.18	1.20
Vitamin B_6 (mg)	1.07	0.93	0.91	1.00
Calcium (mg)	1.47	1.63	1.32	1.16
Phosphorus (mg)	1.77	1.96	1.59	1.40
Magnesium (mg)	1.93	1.52	1.18	1.00
Iron (mg)	1.07	1.19	1.18	0.84

NOTE: An INQ of 1.0 or more indicates that the meal is of high nutritional quality. INQs below 1.0 indicate that the meal will not provide 100% of the target level RDA (one-third) unless the target RDA for calories is exceeded.

Data Source: On-Site Meal Observations.

Exhibit VII.34

Indices of Nutritional Quality (INQs) for
the Average NSLP Meal Consumed in Middle/Secondary Schools
(SY 1989-90)

	INQs for Male Students 11-14 Years	INQs for Female Students 11-14 Years	INQs for Male Students 15-18 Years	INQs for Female Students 15-18 Years
Protein (gm)	2.37	2.03	2.16	2.12
Vitamin A (mcg R.E.)	0.97	1.09	1.16	1.09
Vitamin C (mg)	1.97	1.74	1.96	1.44
Thiamin (mg)	1.30	1.35	1.36	1.35
Riboflavin (mg)	1.67	1.71	1.68	1.71
Niacin (mg N.E.)	1.30	1.29	1.32	1.29
Vitamin B_6 (mg)	0.97	1.03	1.00	0.97
Calcium (mg)	1.30	1.15	1.56	1.15
Phosphorus (mg)	1.60	1.41	1.92	1.41
Magnesium (mg)	1.17	1.00	0.96	0.91
Iron (mg)	1.30	0.91	1.56	0.91

NOTE: An INQ of 1.0 or more indicates that the meal is of high nutritional quality. INQs below 1.0 indicate that the meal will not provide 100% of the target level RDA (one-third) unless the target RDA for calories is exceeded.

Data Source: On-Site Meal Observations.

Exhibit VII.35

Macronutrient, Cholesterol and Sodium Content of the Average NSLP Meal Offered, Selected and Consumed in Elementary and Middle/Secondary Schools Compared to the Dietary Guidelines for Americans (SY 1989-90)

	USDA/DHHS Dietary Guidelines for Americans	Elementary Schools (n=40)				Middle/Secondary Schools (n=20)			
		Offered	Selected	Consumed	Difference (%) (Con vs. Sel)	Offered	Selected	Consumed	Difference (%) (Con vs. Sel)
Percent Calories from Total Fat	≤30.0	38.4	36.0	36.1	+0.1%	38.0	38.4	38.1	-0.3
Percent Calories from Saturated Fat	<10.0	14.8	14.2	14.3	+0.1	15.0	15.0	15.1	+0.1
Percent Calories from Carbohydrate	55.0-65.0[1]	46.4	49.2*	48.9*	-0.3	46.4	46.0	46.1	+0.1
Percent Calories from Protein	5.0-15.0[1]	16.8	16.5	16.6	+0.1	17.0	16.9	17.0	+0.1
Mean Cholesterol (mg)	n.q.[2]	84	79*	61*	-22.8+	99	94	85	-9.6
Mean Sodium (mg)	n.q[2]	1,102*	1,120*	859*	-23.3+	1,341	1,422	1,290	-9.3

[1]The USDA/DHHS Dietary Guidelines do not provide specific recommendations for the proportion of calories from carbohydrates and protein. RDAs for protein for school age children range from 5 to 8 percent of total calories. In general, the average protein intake considerably exceeds the RDA. The National Research Council (NRC) report Diet and Health recommends maintaining total protein levels lower than twice the RDA for all age groups and that the intake of carbohydrates be more than 55% of total calories. To achieve the recommended levels of calories from fat, carbohydrate and protein content would need to be in these ranges.

[2]Not quantified. There is no established Recommended Dietary Allowance or Estimated Safe and Adequate Intake for cholesterol or sodium. The Dietary Guidelines for Americans recommend choosing a diet low in cholesterol and use of salt and sodium only in moderation. The National Research Council (NRC) report Diet and Health recommends that adults and children limit salt intake to 6 grams per day, equal to 2400 mg of sodium, and dietary cholesterol intake to less than 300 mg per day.

*Difference between elementary and middle/secondary schools is statistically significant at the .01 level.

+Difference between meal as selected and meal as consumed, within school type, is statistically significant at the .01 level.

Data Source: On-Site Meal Observations.

Exhibit VII.36

Frequency Distribution of the Level of Fat, Cholesterol and Sodium Provided in the Average NSLP Meal Consumed in Elementary and Middle/Secondary Schools (SY 1989-90)

	Percent of Schools		
	Elementary (n=40)	Middle/ Secondary (n=20)	All Schools (n=60)
Percent Calories from Fat			
≤ 30 percent (D.G. Goal)[1]	8	5	7
31-35 percent	27	5	20
36-38 percent	43	45	43
39-40 percent	13	30	18
> 40 percent	10	15	12
Percent Calories from Saturated Fat			
< 10 percent (D.G. Goal)[1]	0	0	0
11-13 percent	40	15	32
14-16 percent	45	60	50
>16 percent	15	25	18
Cholesterol (mg)[2]			
≤ 75 mg	85*	40	70
76-100 mg	15	50	27
101-150 mg	0	5	2
151-200 mg	0	5	2
Sodium (mg)[2]			
≤ 800 mg	32*	5	23
801-1,000 mg	55	0	37
1,001-1,200 mg	10	35	18
1,201-1,500 mg	2	50	18
> 1,500 mg	0	10	4

[1]Level of intake recommended in the USDA/DHHS Dietary Guidelines for Americans.

[2]The Dietary Guidelines for Americans recommend choosing a diet low in cholesterol and use of salt and sodium only in moderation. The National Research Council (NRC) report Diet and Health recommends that adults and children limit salt intake to 6 grams per day (equal to 2400 mg. of sodium) and cholesterol intake to less than 300 mg. per day.

*Chi-square test of differences between elementary and middle/secondary schools is significant at the .01 level.

Data Source: On-Site Meal Observations.

Measures for individual food items were averaged by food group across all observations (within school group) to compute an overall average for each food group in each type of school. These data are presented in Exhibit VII.37. The column in this exhibit labeled "Average Percent Consumed" can be interpreted as the converse of plate waste, i.e., it represents the proportion of available food that, on average, was consumed by children in each school.

Overall, elementary school students consume about three-quarters of the lunch foods they select, and middle/secondary school students consume almost ninety percent of the foods they select. As the preceding nutritional analyses suggested, elementary school students waste significantly more of the food they select than do middle/secondary students. The particular foods that elementary school students appear to waste more often than middle/secondary school students are, in descending order, cooked vegetables, salads and other raw vegetables, rolls and milk.

Exemplary SFAs vs. Typical SFAs

NSLP meals in SFAs selected as "exemplary" turned out to be no different than meals in "typical" SFAs, as Exhibits ET-VII.3 through ET-VII.8 demonstrate. Differences between the quantities of nutrients provided in NSLP meals by exemplary and typical SFAs were examined via t-tests for meals as offered, selected and consumed. The mean proportions of calories supplied by fat (total, saturated and unsaturated), protein and carbohydrate were also evaluated. Only one statistically significant difference emerged from this line of analysis--the vitamin C content of meals offered in elementary schools in exemplary SFAs was greater than that of elementary schools in typical SFAs.1/

There are a number of possible explanations for the lack of discernible differences between these two groups of SFAs. First, although each exemplary SFA, by definition, was thought by FNS Regional Office or State-level staff to have initiated some effort toward improving the nutritional quality of NSLP meals, there was considerable diversity within the group in terms of the goals of these interventions as well as the specific actions taken. Interviews conducted with food service managers in these SFAs revealed that a minority had extensive efforts underway, including computerized nutritional analysis, numerical goals for fat, saturated fat, sodium, and sometimes sugar, for use in meal planning, and training for cooks and other food service staff.

1/Frequency distributions were also examined for all nutrients in all three levels of meal analysis; no significant differences were noted. In addition, the two types of typical SFAs, i.e., those participating in menu modification grants and those that were not (see Chapter I), were compared. Only one difference--the level of vitamin C in the average meal offered in elementary schools--was detected.

Exhibit VII.37

Average Consumption of Food Portions Selected by or Served to Students in NSLP Meals Consumed in Elementary and Middle/Secondary Schools (SY 1989-90)

Meal Component/Food Item	Elementary Schools		Middle/Secondary Schools	
	Percent of Meals Offering (n=198)	Average Percent Consumed[1]	Percent of Meals Offering (n=99)	Average Percent Consumed[1]
ALL ITEMS	--	76%*	--	87%
MILK	100%	78*	100%	93
Whole Milk	71	74*	83	90
Lowfat Milk	93	73*	99	91
Skim Milk	32	72*	39	92
Flavored Milk	90	80*	96	94
FRUIT	93	74	94	85
FRESH FRUIT	44	68	49	80
Apple	23	62	24	77
Banana	7	71	9	74
Cantaloupe	1	48	1	100
Grapefruit	1	75	0	NA
Grapes	4	91	1	100
Orange	21	67*	32	90
Pear	3	75	8	++
Watermelon	1	84	2	94
Fruit Salad	1	75	3	56
CANNED FRUIT	58	74	70	82
Applesauce	18	75	23	77
Apricots	2	50	2	++
Fruit Cocktail	23	72	24	84
Peaches	12*	82	28	85
Pears	16	74	19	86
Pineapple	9*	78	23	81
Plums	1	17	2	100
Strawberries	1	83	0	NA
Other Berries	1*	92	5	83
FRUIT JUICE	34	87*	48	94
DRIED FRUIT	3	60	7	78
OTHER FRUIT CHOICES	19	74	20	80
Crisps, Cobblers	9	68	9	77
Gelatins (made with fruit juice or fruit) Juice Bars, Misc.	11	79	11	81

Exhibit VII.37

(continued)

Meal Component/Food Item	Elementary Schools: Percent of Meals Offering (n=198)	Elementary Schools: Average Percent Consumed[1]	Middle/Secondary Schools: Percent of Meals Offering (n=99)	Middle/Secondary Schools: Average Percent Consumed[1]
VEGETABLES[2]	91%	62%*	86%	82%
RAW VEGETABLES	49*	58*	67	83
Lettuce, Salad	36*	60*	58	83
Other Raw Vegetables	13	58*	13	83
Cole Slaw, Miscellaneous Salads	5	44*	8	83
COOKED VEGETABLES	45	52*	39	78
Corn	17	67*	13	85
Green Beans	10	59	8	56
Broccoli	6	67	7	84
Cabbage	1	16	2	++
Peas	5	29	2	60
Carrots	1	56	2	++
Mixed Vegetables	13	25	10	50
Onion Rings	1	90	2	100
Spinach, Greens	2	58	0	NA
Miscellaneous Vegetables	3	0	3	100
POTATOES	43*	77	61	85
French Fries, Tater Tots, etc.	35*	79	54	85
Other Potatoes	9	65	15	85
BEANS, LEGUMES	12	46	6	59
SOUPS	1*	45	8	48
BREADS/BREAD ALTERNATES[3]	49	66*	62	82
Bagels	1	64	0	NA
Bisquits/Croissants	4	62	3	80
Bread, Toast	8	69	10	79
Cornbread	8	60	3	79
Crackers	4*	70*	15	94
Rolls	18	62*	29	81
Sweet Buns	2	76	3	88
Fruit Muffins/Breads	1	60	0	NA
Tortillas, Taco Shells	1	++	0	NA
Rice	7	66	7	81
Pasta, Noodles	1	100	2	64
Pancakes, Waffles	2	88	1	199

Exhibit VII.37

(continued)

Meal Component/Food Item	Elementary Schools: Percent of Meals Offering (n=198)	Elementary Schools: Average Percent Consumed[1]	Middle/Secondary Schools: Percent of Meals Offering (n=99)	Middle/Secondary Schools: Average Percent Consumed[1]
ENTREE	100%	77%	100%	91%
MEAT/POULTRY/FISH[4]	33	78	35	92
Beef - Roast, Ribs	1	88	2	100
Breaded Fried Steak	2	77	2	++
Broiled Steak	1	73	1	95
Meatloaf	1	76	1	83
Pork Chop	0	NA	2	88
Baked, BBQ Chicken	5	69	6	86
Chicken Nuggets, Patty	6	93	6	94
Chicken or Turkey Croquettes	1	31	3	88
Roast Turkey	1	66	1	95
Fish Nuggets, Sticks	2	75	0	NA
Fried Clams	0	NA	1	96
Breaded Fish Portion	4	74	7	92
Bacon, Sausage	4	92	2	100
Chili (Mostly Meat)	6	76	5	96
Cold Meat, Cheese Plate	4	64	1	50
MEAT AND GRAIN COMBINATIONS	74	80	78	92
BURGERS AND SANDWICHES	57	79	67	92
Hamburger, Cheeseburger	9*	90	39	92
Steak, Roast Beef Sandwich	3	58	5	88
Sloppy Joe, BBQ Beef	6	84	4	88
Hot Dogs, Corn Dogs	19	81*	24	96
Fried Chicken Sandwich	10	78*	14	95
Fried Fish Sandwich	4	79	6	84
Coldcut Sandwich, Sub Sandwich	7*	85	19	91
Ham & Cheese Sandwich	4*	63*	18	95
Grilled Cheese Sandwich	4	72	5	96
Tuna Salad Sandwich	2	73	6	50
Egg Salad Sandwich	0	NA	1	++
Peanut Butter & Jelly Sandwich	.13	74	7	72
Turkey Sandwich	2	58*	6	100
OTHER MEAT AND BREAD COMBINATIONS	33	82	39	72
Pizza	22	85	27	91
Burrito, Enchilada	4	76	10	96
Taco, Nacho	6	84	8	96
Pot Pies	1	75	1	85
French Toast	1	84	1	83
Macaroni & Cheese	3	63	3	94
Beef & Noodles, Goulash, Miscellaneous	1	69	2	83

-continued-

Exhibit VII.37
(continued)

Meal Component/Food Item	Elementary Schools: Percent of Meals Offering (n=198)	Elementary Schools: Average Percent Consumed[1]	Middle/Secondary Schools: Percent of Meals Offering (n=99)	Middle/Secondary Schools: Average Percent Consumed[1]
MEAT, GRAIN, VEGETABLE COMBINATIONS[5]	15%	71%	24%	84%
Spaghetti with Meat Sauce	6	70	8	85
Lasagna, Ravioli, etc.	3	76	7	83
Taco, Taco Salad	7	76	3	88
Salad Bars[6]	0*	NA	6	87
MEAT, VEGETABLE COMBINATIONS	8	86	15	88
Chef Salad[7]	6	45	10	68
Salad Bar[7]	1	85	3	90
Potato Bar	1	88	1	92
Stir Fry, Miscellaneous	1	79	1	79
DESSERTS[8]	31	83	29	85
Pies, Tarts	3	67	0	NA
Cookies	14	83	12	92
Cakes, Brownies	7	83	11	80
Gelatins (without added fruit or juice)	1	100	5	71
Ice Cream, Puddings	9	84	5	77

[1]Percentages reflect the proportion of student meals that included each item (or category) when the food was available. Sample size not reported because it varies for every item in the table.

[2]Includes vegetables offered as a separate item, i.e., not included in combination items such as chef salads, tacos, taco salad, etc.

[3]Includes breads/bread alternates offered as a separate item, i.e., not included in combination items such as sandwiches, burgers, pizza, pasta dishes, etc.

[4]Meat, poultry and fish items offered separately.

[5]SFAs considered these items to meet part or all of the vegetable/fruit meal pattern requirements.

[6]These salads included a roll, crackers, pasta salad or other item that met some or all of the bread/bread alternate requirement.

[7]These salads did not include bread/bread alternate components.

[8]Includes foods served in reimburseable meals that were not creditable toward any component in the NSLP meal pattern.

* Difference between elementary and middle/secondary students is significant at the .01 level.

++Consumption data not available because none of the students included in the plate waste observations selected this item.

NA: Consumption data not available because none of the schools offered this item.

Data Source: On-Site Meal Observations

Most of the exemplary SFAs had menu modification efforts that were less comprehensive and less well-defined. Many reported implementing simple steps such as deleting added fats from cooked vegetables, baking processed food items rather than frying, and purchasing low-calorie dressings. Few of these managers cited specific numerical goals for fat or sodium in school meals, or direct assessment of the impact or effectiveness of the menu modification efforts cited. The manager in one exemplary SFA did not mention any efforts directed at lowering fat, cholesterol or sodium in school meals.

Second, as Exhibit VII.38 indicates, many of the typical SFAs reported involvement in similar, and in some cases more extensive, activities aimed at decreasing fat, cholesterol and/or sodium in NSLP meals. Over half of the typical SFAs had initiated menu modification steps to decrease the level of fat in NSLP meals. The specific strategies mentioned by managers in these SFAs were not as detailed as those of the most elaborate programs in exemplary SFAs, but they were very similar to the more limited general steps identified by the majority of exemplary SFAs.

Thus, while it was indeed true that exemplary SFAs had initiated efforts to improve the nutritional quality of NSLP meals, the variability within the group in terms of the specific actions taken, coupled with the fact that many typical SFAs were employing the same intervention strategies as exemplary SFAs, means that, on average, NSLP meals were essentially the same in both groups of SFAs.

Exhibit VII.38

Menu Modification Efforts of Exemplary and Typical SFAs (SY 1989-90)

Menu Modification Effort	Percent of SFAs		
	Exemplary SFAs (n=10)	Typical SFAs (n=10)	All SFAs (n=20)
Decrease Fat	90%	60%	75%
Decrease Sodium	80	20	50
Decrease Sugar	50	40	45
Increase Fiber	30	10	20
Increase Complex Carbohydrates	10	10	10
None: Using USDA Menu Planning Guidelines Only	10	40	25

Data Source: SFA Manager Interview.