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ABSTRACT

Oregon's Food Pyramid Choice Menus (FPCM) require that participating elementary schools offer three to seven entrees, at least two types of milk, and six to ten fruits and vegetables, as well as three or more types of grain products in a variety bar daily. The study discussed in this report was designed to answer two questions: (1) do the menus, as planned for third graders, meet the energy and nutrient requirements specified in 1995 U.S. Department of Agriculture (USDA) regulations; and (2) what are the energy content and nutrient content of the FPCM selected and eaten by third-graders? Findings indicate that elementary school lunches planned under the FPCM system succeed in, or very closely approach, meeting all 1995 USDA standards for the energy and nutrient content of elementary school lunches. Although the FPCM system succeeds, in large part, in serving meals that meet those standards, third-graders appear to be willing to eat only about 70 percent of the food offered. The report recommends implementing the FPCM system statewide and suggests providing menu guidelines and staff training, along with nutrition education for children to help schools serve and children eat lunches somewhat lower in fat and higher in iron than they currently do. The report notes that schools could also benefit from reviewing their menus for fiber and sodium content. Includes three appendices: (1) "List of Schools in Each Food Service Category"; (2) "Samples of Forms for Collecting Question 1 Data"; and (3) "Sample of Forms for Collecting Question 2 Data." (LPP)

# Oregon's Food Pyramid Choice Menus - Do lunches as offered to, and selected, and consumed by third graders meet current USDA nutrition standards?

A Research Report to the Child Nutrition Division, Oregon Department of Education

Submitted by:

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## Oregon's Food Pyramid Choices Menus - Do lunches as offered to, and selected and consumed by third graders meet current USDA nutrition standards?

The Child Nutrition Programs (CNP) Division of the Oregon Department of Education contracted with the NFM Department of Oregon State University to evaluate Food Pyramid Choice Menus (hereinafter FPCM) as a means of meeting USDA standards for elementary school lunches. The study was conducted during the 1996-1997 school year and data were analyzed during calendar year 1997. The study was designed to answer two questions: 1) Do Food Pyramid Choices Menus, as planned, for third graders, meet the energy and nutrient requirements specified in 1995 USDA regulations? and 2) What are the energy and nutrient content of FPCM selected and eaten by third graders? The specific objectives of the study were to:

1. Determine whether FPCM for third graders, planned for one week by Oregon schools, comply with USDA standards (Federal Register, 1995) for energy and nutrient content of lunches as offered (energy, total fat and saturated fat as a percentage of energy, protein, calcium, iron, vitamins A and C) and also to measure cholesterol, sodium and dietary fiber content of meals. Menu item choices for each menu component will be weighted by the proportion of children selecting each choice of entree and milk and the relative total amounts of variety bar items served.

2. Detect differences, if they exist, between the energy and nutrient content of meals planned by schools which use on-site, satellited and centrally-planned/site prepared methods of meal planning and preparation.

3. Determine whether Oregon school districts using FPCM comply with CNP standards for food choices offered.

4. Determine the proportion of third graders choosing each category of food - entree, fruit/ vegetable, bread/grains, milk) under the FPCM system.

5. Determine the nutrient content (for energy and nutrients in Objective 1 above) of meals selected and consumed by third graders under the FPCM system.

6. Determine the percent of plate waste for each category of food selected by third graders, under the FPCM system..

## Executive Summary

**Do Food Pyramid Choice Menus, as planned, for third graders, meet the energy and nutrient requirements specified in 1995 USDA regulations?**

Elementary school lunches planned under Oregon's Food Pyramid Choice Menus system, succeed in, or very closely approach, meeting all 1995 USDA standards for the energy and nutrient content of elementary school lunches. Elementary schools across the state, which follow the FPCM system for planning their menus, on average, generously meet the USDA standards set for energy, protein, vitamin and mineral content of lunches. They come very close to meeting USDA standards for the fat content of lunches. FPCM elementary school lunches are higher in carbohydrate and lower in saturated fat and cholesterol than elementary school lunches in the most recent national survey. FPCM also provide more vitamin A and less cholesterol than elementary school lunches nationwide.

The FPCM system requires participating schools to offer three to seven entrees; at least two types of milk; and six to ten fruits and vegetables as well as three or more types of grain products in a variety bar daily. This menu plan emphasizes foods which are high in complex carbohydrate, vitamins and minerals and relatively low in fat. The average energy content of lunches offered was 709 kcal/day, which exceeds the USDA standard of 664 kcal/day. The mean protein content of lunches was 30 grams, about three times the USDA standard. The mean calcium, iron, vitamin A and vitamin C content of lunches as offered exceeded the USDA standard generously. Thirty two percent of the total energy offered was from fat and 10.7 percent was from saturated fat, each a very small amount higher than the standard. Although there are not currently USDA standards for the fiber, cholesterol and sodium content of lunches offered, it is recommended that these nutrients be monitored in school lunches. The cholesterol content of FPCM lunches averaged 62 mg/day. This amount is well below 100 mg/day, which is one-third of the generally accepted daily recommendation. Dietary fiber content was lower, at 5.8 g/lunch, and sodium higher, at 1461 mg/lunch, than one-third the respective recommendations for these nutrients daily (8 grams or more and 800 mg or less).

**What are the energy and nutrient content of FPCM selected and eaten by third graders?**

USDA has set standards for the amounts of energy and nutrients to be offered in school lunches. While FPCM succeed, in large part, in serving meals which meet those standards, third graders appear to be willing to eat only about seventy percent of the food offered. Even so, third graders at two schools serving FPCM, ate self-selected lunches with almost twice the protein, and more vitamin A, vitamin C and calcium, on average, than minimum amounts recommended by USDA. Intakes were within generally accepted standards for cholesterol and sodium. But third graders ate less iron than recommended by USDA and less dietary fiber than generally recommended, in their lunches. Third graders ate lunches modestly higher in fat and saturated fat than recommended . They selected and ate lunches proportionately lower in carbohydrate and higher in fat than were offered.

Third graders selected lunches providing close to the USDA standard for energy. Children selected lunches with an average of 653 kcal/day but only 462 kcal/day were actually eaten from those lunches. Thirty six percent of the energy in lunches as selected was from fat and 14% was from saturated fat. The children actually ate 35% of their lunch kcalories in the form of fat and 13% in the form of saturated fat. Third graders selected lunches with 26 grams of protein and ate 18 grams of protein from those lunches.

**Recommendations:**

The Food Pyramid Choice Menu system, largely, succeeds in offering menus meeting most USDA standards and would be worthwhile to implement statewide, for elementary schools. Menu guidelines and staff training, along with nutrition education for children, may help some schools to serve, and children to eat, lunches somewhat lower in fat and higher in iron than they currently do. Most or all schools could benefit from reviewing their menus for fiber and sodium content.

**Methodology:**

The research was approved by the OSU Institutional Review Board for the Protection of Human Subjects before it was undertaken.

For **Question 1:** A list of all elementary schools in Oregon serving FPCM, categorized by service type, as of September 1996 (revised in July, 1997) was provided to the contractor. There were 169 FPCM elementary schools on the list; 70 with centrally planned and prepared lunches, 59 with centrally planned/site prepared lunches and 40 with on-site planned and prepared lunches. With advice from the OSU Survey Research Center, a systematic, geographically representative sample of 36 schools, stratified by the three service types (14 centrally planned and prepared, 14 centrally planned/site prepared and 8 on-site planned and prepared), was selected. The Food Service Director of each sample school was contacted by telephone during September 1996 and asked to participate in the study. During this process 11 of the 36 schools (3 centrally planned and prepared, 5 centrally planned/site prepared and 3 on-site planned and prepared) were identified as ineligible for the study either because they had not actually implemented FPCM or because the service type they were categorized in was incorrect. All 25 of the valid 25 schools remaining (10 centrally planned and prepared, 9 centrally planned/site prepared and 4 on-site planned and prepared) agreed to participate in the study. Permission letters were sent and signed by the Food Service Director of the sample school and the district School Superintendent before any data were collected. A list of participating schools is in Appendix A.

A list of NETPRO trainers on contract with the CNP Division was provided to the contractor and a NETPRO trainer was recruited by telephone to assist in data collection for each school. Data collection forms were developed by the contractor ( Appendix B), and included a form and detailed instructions to record each day's menus including amounts of each food planned and the recipe or label for each food in the menu. All forms were mailed to the NETPRO trainers who met with the Food Service Directors before the week of data collection to go over methods for measuring and recording with the FSD. The menus were recorded as planned as of two weeks before service. All menus were recorded for one complete week of lunches (some schools served lunches only four days each week) and the forms and food labels were mailed back to the contractor. Some schools were unable to record menus for a week during November or December 1996 and they recorded a week in January or February 1997. Data were received from twenty-three schools. One school's data was reported lost in the mail and one school failed to send their data to the contractor after many requests. By May of 1997 data were received from 23 schools which constituted the sample for Question 1. The schools were 10 with centrally planned and prepared lunches (CPP), nine with centrally planned/site prepared lunches (CPSP) and 4 with on-site planned and prepared lunches (OPP).

Menu items were classified into the following categories for analyses: entree, milk, fruits, vegetables, grains, condiments, potatoes, other. Each food item in each menu was entered separately into the NUTRIKIDS diet analysis software. Each food item in a food category was weighted by its proportion of the entire food category for energy and nutrient analysis. Negotiations were conducted with NUTRIKIDS personnel who eventually provided an additional program for saving nutrient data in ASCII format for data analysis. The NUTRIKIDS program included missing data for some nutrients for some food items and these were added by the contractor from the Food Processor diet analysis software (ESHA Research) which has the most complete data base known to the contractor so that there are no missing nutrient values for any foods in the analysis. This means that the analyzed nutrient values in this report are as accurate and complete as possible and do not include any underestimates due to missing data. All data was entered by three NFM graduate students and data were cross-checked for accuracy.

Data for all 23 schools were analyzed using SUDAAN software. The data for each type of service was weighted proportionately to the total number of schools in that service category. SUDAAN is a specially designed data analysis program which allows this type of data weighting and produces weighted results which can be extrapolated to all 169 FPCM elementary schools on the original list.

For **Question 2:** The Reynolds School District was selected by the CNP Division to draw a sample of third graders for the measurement of FPCM as selected and eaten. Glenfair and Troutdale Schools were selected because they each have a broad mix of students qualifying for free, reduced and full price lunches and because they were particularly enthusiastic about the study. The Contractor met with the district Food Service Manager in December 1996 to plan the study and visit the two schools. It was decided to include all third graders at both schools (three classes at Glenfair and two classes at Troutdale) and to collect data for one week during February 1997. Data collection methods were researched, data collection forms developed (Appendix B) and a trial run was conducted at an elementary school in Corvallis.

In advance of data collection detailed menus were received for each day of the week to be measured at each school. Data collection forms were designed and printed. All participating children and a parent signed an informed consent letter. On the morning of each day of data collection a team of OSU student data collectors set up a command post in each of the two school kitchens. As menu items were prepared several samples (usually five) of each unitary item (e.g. entrees) were weighed. Several different size servings of food items available in bulk (e.g. applesauce or salad dressing) were measured and weighed or counted and weighed (e.g. broccoli florets). For items measured and weighed sample servings of each size were kept on hand.

Before meal service each day each child in the sample received a tray with a personal name tag and a number sticker on the bottom (for identification of leftovers). They went through the entree and milk line and the variety bar as usual. Then they gave their tray to a researcher who took it out of sight and the research team, with the assistance of CNP nutritionists and staff, estimated the amount of each item selected in comparison to the pre-measured samples exhibited. The children then were given back their trays, ate their lunches, and left their trays on the table. Researchers picked up the trays and weighed all leftovers.

Amounts of all foods selected and leftover by each child were recorded. The amount of each food leftover was subtracted from the amount selected by each child to determine the amount eaten. The amounts of each food selected and eaten by each child were analyzed using The Food Processor nutrient analysis software. The menus as planned for each school for the entire week were also analyzed using NUTRIKIDS software according the method for Question 1. Children who ate lunch at least three days during the study week were included in the sample. There were 93 third graders in the final sample. All data were entered in SPSS mainframe software and analyzed.

## Results

### Question 1: Do Food Pyramid Choice Menus, as planned, for third graders, meet the energy and nutrient requirements specified in 1995 USDA regulations?

**Objective 1:** Determine whether FPCM for third graders, planned for one week by Oregon schools, comply with USDA standards for energy and nutrient content of lunches as offered (energy, total fat and saturated fat as a percentage of energy, protein, calcium, iron, vitamins A and C) and also measure cholesterol, sodium and dietary fiber content of planned meals. Menu item choices for each menu component will be weighted by the proportion of children selecting each choice of entree and milk and the relative total amounts of variety bar items served.

Table 1 shows the weighted mean daily energy and nutrient content of FPCM lunches planned for elementary schools in Oregon in late 1996 and early 1997. These means are compared to National School Lunch Program standards. Also shown is the proportion of schools meeting the NSLP standard for energy and each nutrient. Weighted mean energy, protein, calcium, iron, vitamin A and vitamin C content of lunches as planned exceed USDA standards, some by a great deal. The mean percent kcal from total fat (32% of kcal) and saturated fat (10.7% of kcal) are modestly greater than the USDA standard and the mean percent kcal from carbohydrate (53% of kcal) is correspondingly modestly lower than the standard. Although USDA has not set standards for dietary fiber, cholesterol or sodium in lunches one might view the

data from the perspective of generally accepted recommendations of at least 8 gm of fiber (1/3 of 25g recommended daily by the American Diabetes Association); not more than 100 mg cholesterol (1/3 the daily amount of 300 mg recommended by the Dietary Guidelines for Americans); and not more than 800 mg sodium (1/3 the 2400 mg recommended daily by the National Research Council in 1980). The mean cholesterol provided in FPCM is well within the cholesterol recommendation. Dietary fiber is lower in lunches planned and sodium is higher than desirable.

When the same data are examined as the proportion of individual schools actually meeting each standard, compliance with NSLP standards appears somewhat less positive. Only 56% met the minimum energy recommendation; about 1/3 of schools met the recommendations for the energy contribution of total fat; about 40% met the recommendations for the energy contributions of and saturated fat and carbohydrate; all schools met the protein, calcium and vitamin A recommendations; over 90% met the vitamin C recommendation; and 74% met the iron recommendation.; Over 90% of the schools met the generally accepted recommendation for cholesterol; fewer than 10% met the generally accepted recommendation for fiber and none met the generally accepted recommendation for sodium. The data demonstrate that FPCM succeed very well in providing nutrient dense lunches with relatively low fat and high carbohydrate content and very adequate micronutrients. While FPCM definitely move in the direction of lowering fat in school lunches, some schools may be doing this at the expense of total energy provided. Also, the nutrients for which USDA has not yet set official standards, but which are also very important in long-term good health, dietary fiber and sodium, still need significant work.

Table 1-A compares Oregon's FPCM lunches to the mean energy and nutrient content of one week's lunches planned for 278 elementary schools in the School Nutrition Dietary Assessment Survey (SNDAS) (Burghardt et al., 1995). Compared with the 278 elementary schools surveyed in the 1992 SNDAS, Oregon's FPCM elementary schools offered about the same amounts of energy and protein, as well as a considerably greater proportion of energy from carbohydrate and considerably smaller proportions from fat and saturated fat as well as less cholesterol. The calcium, iron and vitamin C content of FPCM lunches and the national sample were similar but Oregon's FPCM lunches included more vitamin A. No doubt this reflects the FPCM emphasis on fruits and vegetables. Interestingly, the fiber content of FPCM lunches appeared a little lower than that in the national sample, in spite of the FPCM emphasis on fruits and vegetables.

The observation that mean daily nutrient content comes close to recommendations yet many schools fall somewhat short of the standards, indicates that many FPCM schools come very close, yet do not quite meet standards. This can be seen in Tables 1-B through 1-F which are comparisons between the proportion of kcalories from total fat, saturated fat and carbohydrate, and the mean daily amounts of cholesterol and sodium in one week of Oregon's FPCM elementary school lunches and the schools studied nationally in the SNDAS. More than two-thirds of FPCM schools come very close to meeting the recommendation for the contribution of kcalories from total fat and over 85% come very close to meeting the recommendation for the contribution of kcalories from saturated fat in school lunches. A much greater proportion of Oregon's FPCM elementary schools meet or come close to meeting the standards for dietary fat than elementary schools did nationally in this study. FPCM schools even did slightly better than the national sample for cholesterol, which seems to be low enough in school lunches in general and in sodium, which is high in school lunches in Oregon and nationally.

Table 1

Mean (+/- SEM) Nutrient Content of One Week's Food Pyramid Choice Menus as Planned
(Data weighted to represent all 169 FPMC Schools based on sample of 23)

| Nutrient | NSLP Standard[1] or Accepted Recommenda-tion[2] | Mean Daily Nutrient Content in Oregon's 169 FPCM Schools[3] +/- SEM | Range in FPCM School Lunches | Percent of FPCM Schools Meeting the Standard |
|---|---|---|---|---|
| Energy (kcal) | ≥ 664 | 709 +/- 29 | 519-1086 | 56% |
| Protein (g) | ≥ 10 | 30 +/- 1 | 23-41 | 100% |
| Carbohydrate (g) | N/A | 94 +/- 5 | 63-152 | N/A |
| % Kcal Carbohydrate | ≥ 55% | 53 +/- 1 | 40-64 | 39% |
| Total Fat (g) | N/A | 25 +/- 1 | 15-37 | N/A |
| % Kcal Total Fat | ≤ 30% | 32 +/- 0.8 | 25-40 | 30% |
| Saturated Fat (g) | N/A | 8.4 +/- 0.4 | 5-12 | N/A |
| % Kcal Saturated Fat | < 10% | 10.7 +/- 0.4 | 8-14 | 39% |
| Calcium (mg) | ≥ 286 | 486 +/- 18 | 340-666 | 100% |
| Iron (mg) | ≥ 3.5 | 4.2 +/- 0.2 | 2.5-6.2 | 74% |
| Vitamin A (RE) | ≥ 224 | 516 +/- 31 | 248-964 | 100% |
| Vitamin C (mg) | ≥ 15 | 31 +/- 2 | 11-60 | 96% |
| Fiber (g)[4] | ≥ 8[2] | 5.8 +/- 0.4 | 3.6-10.6 | 9% |
| Cholesterol (mg)[4] | ≤ 100[2] | 62 +/- 5 | 38-124 | 91% |
| Sodium (mg)[4] | ≤ 800[2] | 1461 +/- 92 | 928-2818 | 0% |

[1]NSLP Standards (Federal Register, 1995).

[2]Standards for cholesterol and sodium intake (National Research Council 1989). Standard for fiber intake (American Diabetes Association, 1994).

[3] One entire week of menus during November or December 1996 or January or February 1997 was used for each of 23 schools. Weekly averages for each were calculated by dividing by the number of days of service (five or four). Nutrikids nutrient analysis software (LunchByte Systems, 1996) was used for nutrient analysis. Missing values for nutrients were added in all cases from Food Processor for Windows 6.11 software (ESHA Research, 1995). Each food item in a FPCM category was weighted based on its proportion of the total food offered in that category.

[4]The NSLP has not established standards for these nutrients but has requested that they be monitored in school lunches.

Table 1A

Comparison of the mean daily nutrient content of one week of Food Pyramid Choice Menus as Planned and one week of menus for 278 elementary schools in the SNDAS

| Nutrient | NSLP Standard[1] or Accepted Recommendation[2] | Mean Daily Nutrient Content in 278 Elementary Schools in SNDAS[3] | Mean Daily Nutrient Content in Oregon's 169 FPCM Schools[4] +/- SEM |
|---|---|---|---|
| Energy (kcal) | ≥ 664 | 723 | 709 +/- 29 |
| Protein (g) | ≥ 10 | 30 | 30 +/- 1 |
| Carbohydrate (g) | N/A | 85 | 94 +/- 5 |
| % Kcal Carbohydrate | ≥ 55% | 47 | 53 +/- 1 |
| Total Fat (g) | N/A | 30 | 25 +/- 1 |
| % Kcal Total Fat | ≤ 30% | 37 | 32 +/- 0.8 |
| Saturated Fat (g) | N/A | 12 | 8.4 +/- 0.4 |
| % Kcal Saturated Fat | ≤ 10% | 15 | 10.7 +/- 0.4 |
| Calcium (mg) | ≥ 286 | 487 | 486 +/- 18 |
| iron (mg) | ≥ 3.5 | 4 | 4.2 +/- 0.2 |
| Vitamin A (RE) | ≥ 224 | 394 | 516 +/- 31 |
| Vitamin C (mg) | ≥ 15 | 28 | 31 +/- 2 |
| Fiber (g)[5] | ≥ 8[2] | 7 | 5.8 +/- 0.4 |
| Cholesterol (mg)[5] | ≤ 100[2] | 84 | 62 +/- 5 |
| Sodium (mg)[5] | ≤ 800[2] | 1406 | 1461 +/- 92 |

[1]NSLP Standards (Federal Register, 1995). Standards for cholesterol and sodium intake (National Research Council 1989). Standard for fiber intake (American Diabetes Association, 1994).

[2]Standards for cholesterol and sodium intake (National Research Council 1989). Standard for fiber intake (American Diabetes Association, 1994).

[3]Nutrient analyses for lunches in SNDAS gave all food choices within a meal component equal weights (Burghardt et al, 1995). This method may have under- or over-estimated some food choices.

[4] One entire week of menus during November or December 1997 or January or February 1998 was used for each of 23 schools. Weekly averages for each were calculated by dividing by the number of days of service (five or four). NUTRIKIDS nutrient analysis software (LunchByte Systems, 1996) was used for nutrient analyses. Missing values for nutrients were added in all cases from Food Processor for Windows 6.11 software (ESHA Research, 1995). Each food item in a FPCM category was weighted based on its proportion of the total food offered in that category. Data for 23 sample schools were weighted to represent all 169 FPCM elementary schools.

[5]The NSLP has not established standards for these nutrients but has requested that they be monitored in school lunches.

Table 1-B

Comparison of mean daily percent of energy from total fat in one week of FPCM lunches as planned and one week of menus for 278 Elementary Schools in the SNDAS

| Food Energy from Fat | Percent of 278 SNDAS Elementary Schools Meeting the Standard[1] | Number of Oregon FPCM Elementary Schools Meeting the Standard | Percent of Oregon FPCM Elementary Schools Meeting the Standard[2] |
|---|---|---|---|
| Less than 30% of kcals[3] | 1% | 10 | 43% |
| 31-34% of kcals | 13% | 7 | 30% |
| 35-36% of kcals | 14% | 2 | 9% |
| 37-38% of kcals | 31% | 2 | 9% |
| 39-40% of kcals | 20% | 2 | 9% |
| More than 40% of kcals | 22% | 0 | 0% |

[1]Nutrient analyses for lunches in SNDAS gave all food choices within a meal component equal weights (Burghardt et al, 1995).

[2]Nutrient analyses for Oregon's FPCM schools gave each food choice within a meal component the weight of its actual proportion of all foods offered in that meal component.

[3]NSLP standard.

Table 1-C

Comparison of mean daily percent of energy from saturated total fat in one week of FPCM lunches as planned and one week of menus for 278 Elementary Schools in the SNDAS

| Food Energy from Saturated Fat | Percent of 278 SNDAS Elementary Schools Meeting the Standard[1] | Number of Oregon FPCM Elementary Schools Meeting the Standard | Percent of Oregon FPCM Elementary Schools Meeting the Standard[2] |
|---|---|---|---|
| Less than 10% of kcals[3] | Not available | 8 | 35% |
| 10-12% of kcals | 5% | 12 | 52% |
| 13-14% of kcals | 18% | 3 | 13% |
| 15-16% of kcals | 43% | 0 | 0% |
| 17-18% of kcals | 25% | 0 | 0% |
| More than 18% of kcals | 10% | 0 | 0% |

[1]Nutrient analyses for lunches in SNDAS gave all food choices within a meal component were equal weights (Burghardt et al, 1995).

[2]Nutrient analyses for Oregon's FPCM schools gave each food choice within a meal component the weight of its actual proportion of all foods offered in that meal component.

[3]NSLP standard.

Table 1-D

Comparison of mean daily percent of energy from carbohydrate in one week of FPCM lunches as planned and one week of menus for 278 Elementary Schools in the SNDAS

| Food Energy from Carbohydrate | Percent of 278 SNDAS Elementary Schools Meeting the Standard[1] | Number of Oregon FPCM Elementary Schools Meeting the Standard | Percent of Oregon FPCM Elementary Schools Meeting the Standard[2] |
|---|---|---|---|
| More than 55% of kcals[3] | 2% | 8 | 35% |
| 45-55% of kcals | 74% | 14 | 61% |
| Less than 45% of kcals | 24% | 1 | 4% |

[1]Nutrient analyses for lunches in SNDAS gave all food choices within a meal component were equal weights (Burghardt et al, 1995).
[2]Nutrient analyses for Oregon's FPCM schools gave each food choice within a meal component the weight of its actual proportion of all foods offered in that meal component.
[3]NSLP standard.

Table 1-E

Comparison of mean daily amount of cholesterol in one week of FPCM lunches as planned and one week of menus for 278 Elementary Schools in the SNDAS

| Cholesterol Content | Percent of 278 SNDAS Elementary Schools Meeting the Standard[1] | Number of Oregon FPCM Elementary Schools Meeting the Standard | Percent of Oregon FPCM Elementary Schools Meeting the Standard[2] |
|---|---|---|---|
| Less than 100 mg[3] | 84% | 21 | 91% |
| 101-133 mg | 16% | 2 | 9% |
| Greater than 133 mg | 0% | 0 | 0% |

[1]Nutrient analyses for lunches in SNDAS gave all food choices within a meal component were equal weights (Burghardt et al, 1995).
[2]Nutrient analyses for Oregon's FPCM schools gave each food choice within a meal component the weight of its actual proportion of all foods offered in that meal component.
[3]National Research Council recommendation, 1989.

Table 1-F

Comparison of mean daily amount of sodium in one week of FPCM lunches as planned and one week of menus for 278 Elementary Schools in the SNDAS

| Sodium Content | Percent of 278 SNDAS Elementary Schools Meeting the Standard[1] | Number of Oregon FPCM Elementary Schools Meeting the Standard | Percent of Oregon FPCM Elementary Schools Meeting the Standard[2] |
|---|---|---|---|
| Less than 800 mg[3] | 0% | 0 | 0% |
| 801-1000 mg | 4% | 3 | 13% |
| Greater than 1000 mg | 96% | 20 | 87% |

[1]Nutrient analyses for lunches in SNDAS gave all food choices within a meal component were equal weights (Burghardt et al, 1995).

[2]Nutrient analyses for Oregon's FPCM schools gave each food choice within a meal component the weight of its actual proportion of all foods offered in that meal component.

[3]National Research Council recommendation, 1989.

Table 2

Comparison of the mean nutrient content of one week's Food Pyramid Choice Menus as offered by schools using three different service types (centrally planned and prepared meals, centrally planned/site prepared meals, and site planned and prepared meals)

| | | Centrally Planned and Prepared (weighted n=70)[1] | | Centrally Planned/Site Prepared (weighted n=59) | | Site Planned and Prepared (weighted n=40) | |
|---|---|---|---|---|---|---|---|
| Nutrient | NSLP Standard | Mean Daily Nutrient Content | Percent of Schools Meeting the Standard | Mean Daily Nutrient Content +/- SEM | Percent of Schools Meeting the Standard | Mean Daily Nutrient Content | Percent of Schools Meeting the Standard |
| Energy (kcal) | ≥ 664 | $637^{x,2}$ +/- 24.0 | 40% | $762^{y}$ +/- 33.0 | 78% | $774^{xy}$ +/-105 | 50% |
| Protein (g) | ≥ 10 | 28 +/- 1.4 | 100% | 31 +/- 1.0 | 100% | 31 +/-3.5 | 100% |
| % Kcal Carbohydrate | ≥55% | 53 +/- 2.0 | 40% | 54 +/- 0.8 | 22% | 51 +/- 1.8 | 25% |
| % Kcal Total Fat | ≤30% | 31.5 +/-1.5 | 40% | 31 +/- 0.9 | 33% | 34 +/- 1.4 | 0% |
| % Kcal Saturated Fat | < 10% | $11.2^{xy}$ +/- 0.7 | 30% | $9.8^{x}$ +/- 0.5 | 56% | $11.5^{y}$ +/- 0.5 | 0% |
| Calcium (mg) | ≥286 | 454 +/- 20 | 100% | 495 +/- 25 | 89% | 544 +/- 55.0 | 100% |
| Iron (mg) | ≥3.5 | $3.7^{x}$ +/- 0.2 | 60% | $4.9^{y}$ +/- 0.2 | 100% | $4.0^{xy}$ +/- 0.7 | 50% |
| Vitamin A (RE) | ≥ 224 | $404^{x}$ +/- 26 | 100% | $554^{y}$ +/- 60 | 100% | $702^{y}$ +/- 88 | 100% |
| Vitamin C (mg) | ≥15 | 28 +/- 4.0 | 100% | 36 +/- 3.0 | 100% | 27 +/- 7.0 | 75% |
| Fiber (g)[3] | ≥ 8 | $4.9^{x}$ +/- 0.2 | 0% | $6.6^{y}$ +/- 0.6 | 11% | $5.9^{xy}$ +/- 1.2 | 25% |
| Cholesterol (mg)[3] | ≤100 | 60 +/- 8.0 | 90% | 60 +/- 4.0 | 100% | 70 +/- 12.0 | 75% |
| Sodium (mg)[3] | ≤800 | $1236^{x}$ +/-83 | 0% | $1564^{y}$ +/- 90 | 0% | $1789^{xy}$ +/- 337 | 0% |

[1]Sample data were weighted based on the total number of FPCM schools in each service category reported as of 9/96. The SUDAAN program were used for data analysis. SUDAAN weights the data so that results can be extrapolated to the entire population of FPCM schools in each of the three service types. The sample included 10 CPP schools, 9 CPSP schools and 4 OPP schools. Each service type was weighted in proportion to the total number of schools in its service category which it represented. One entire week of menus, as planned, during November or December 1996 or January 1997 were used for each of 23 schools. Weekly averages for each school were calculated by dividing by the number of days of service (five or four). The Nutrikids nutrient analysis software was used for nutrient analysis. Each food item in a FPCM category was weighted based on its proportion of the total foods in that category offered. Missing values for nutrients were added in all cases from Food Processor for Windows software (ESHA Research).

[2]Different superscripts in different columns indicate that the service types were significantly different, $p \leq .05$.

[3]The NSLP has not established standards for these nutrients but has requested that they be monitored in school lunches.

**Objective 2**: Detect differences, if they exist, between the energy and nutrient content of meals planned by schools which use CPP, CPSP and OPP methods of meal planning and preparation.

Table 2 shows that there are differences in the energy nutrient content of lunches offered under three different service types. The comparison is shown two ways:

*A. Proportion of FPCM schools in each service category meeting each USDA energy and nutrient standard in lunches offered:*

The energy level of lunches offered is a concern for schools in all service types. CPSP service schools were most likely to meet the minimum energy standard for lunches. At least half of the schools in the other two categories offered lunches with energy levels below the USDA standard and the mean energy content of lunches in the CPP schools appears low compared to schools with the other service types. All schools in each service category exceeded the recommendations for protein. In fact, the mean protein offered in lunches is about three times the recommendation in each service category. Although the proportion of energy from total fat, saturated fat, and carbohydrate offered were close to those recommended, many schools in each service category did not quite meet these standards. More CPP and CPSP schools than OPP schools met recommendations for percent of kcalories from fat and carbohydrate. Forty percent of schools in the CPP service category planned meals providing 30% of less of energy from total fat. None of the schools in the OPP service type met the standard for total fat content of lunches. The largest proportion of schools meeting the saturated fat standard of less than 10% of energy were the CPSP service type. Again, none of the OPP school met this standard. Perhaps OPP schools could benefit from more professional assistance in controlling the fat content of lunches.

The micronutrient content of lunches offered by schools using each service type was very adequate. All schools in each service type met the USDA standard for vitamin A and calcium and almost all for vitamin C. The CPSP service type was the only one for which all schools met the USDA standard for iron. For the other two service types only 60% or fewer schools me the iron standard.

*B. Statistical comparison of weighted mean daily energy and nutrient content of lunches planned by FPCM elementary schools using each of the three service types.*

The statistical comparison indicates that the CPSP service type schools offered lunches, on the average, with more energy, less saturated fat, more fiber and more of most micronutrients, including sodium, than did centrally planned and prepared service type schools. The sample size of only four OPP service type schools was much smaller than the other two types, making it more difficult to detect statistical differences between these schools and the others. But schools with this type of service did offer lunches with more saturated fat than did CPSP service type schools and more vitamin A than did CPP schools.

**Objective 3**: Determine whether Oregon school districts which use FPCM comply with CNP Division standards for food choices offered.

Table 3
Average Number of Daily Choices[1] Offered in each FPCM Food Category by Schools using Three Different Types of Service

| Food Category | FPCM Standard | Centrally Planned and Prepared<br>n=10 | Centrally Planned/Site Prepared<br>n=9 | Site Planned and Prepared<br>n=4 |
|---|---|---|---|---|
| Entree | 3-7 | 3.8 | 3.5 | 2.25 |
| Milk | 2 | 2 | 2 | 2 |
| Fruits/Vegetables | 6-10 | 5.7 | 7.7 | 6.25 |
| Grain Products | 3 or more | 0.6 | 1.5 | 1.5 |

[1]Food category choices were averaged over one week of menus for each school.

Table 3 indicates that CPP and CPSP schools served an average number of daily entrees meeting the minimum standard for FPMC schools of at least three different entrees per day. The OPP schools averaged only 2.25 different entrees per day. Schools in all services types averaged two types of milk daily, thereby meeting the FPCM standard. The FPCM standard for fruit/vegetables offerings is 6-10 different fruits and vegetables each day. This standard was met by the CPSP and OPP service type schools. The CPP service type schools averaged only 5.7 choices per day, slightly short of the standard. None of the service types even came close to meeting the FPCM standard for grain products of at least three choices daily. CPP school lunches were farthest from this standard, offering an average of less than one type of grain product daily. Increasing low-fat grain product offerings would be one way to increase the proportion of energy from carbohydrate in lunches and, for CPP schools, to increase the total energy value of lunches offered.

**Question 2: What are the energy and nutrient content of FPCM selected and eaten by third graders?**

**Objective 4**: Determine the proportion of third graders choosing each category of food - entree, fruit/vegetable, bread/grains, milk) under the FPCM system.

Table 4
Percent of third graders who selected foods from each FPCM food category at least once during a week, average kcalories in each food category as planned, selected and eaten, and average percent of kcalories left over from each food category

| FPCM Food Category | Mean Percent of Third Graders Who Selected Food Category at least once during a week n=93 | Mean Daily Kcal Planned from Category | Mean Daily Kcal Selected from Category | Mean Daily Kcal Eaten from Category | Mean Daily Percent of Kcal Eaten Contributed by Category | Mean Daily Percent of Kcal Selected which were Left Over |
|---|---|---|---|---|---|---|
| Entree | 100% | 351 | 324 | 234 | 51% | 28% |
| Milk | 97% | 87 | 105 | 66 | 14% | 38% |
| Fruits | 96% | 88 | 67 | 49 | 11% | 26% |
| Vegetables | 61% | 13 | 6 | 4 | 1% | 33% |
| Grains | 96% | 106 | 83 | 65 | 14% | 22% |
| Condiments | 55% | 18 | 30 | 19 | 4% | 37% |
| Other Foods | 72% | 33 | 37 | 25 | 5% | 33% |

[1]For this analysis the FPCM categories were used for entrees, milk and grains. Fruits and vegetables were separated in order to provide more specific information. Condiments constituted a separate category and included salad dressings, margarine, butter, catsup, mustard, special sauces, salsa, mayonnaise and pickles. The category *other foods* represents individual packets of sunflower seeds.

Table 4 shows that all third graders selected an entree and almost all selected milk, fruit and grain products at least once during a week. Only 61 percent selected a vegetable at least once a week. Only about half used condiments and almost three-fourths selected other foods at least once during the week.

The greatest contributor to energy from lunches as selected was the entree, providing 324 kcal per day. Only about 75% of the entree (234 kcal) was eaten. Fifty one percent of the energy eaten from lunches was contributed by the entree, 14% from each of milk and bread/grain products, 11% from fruits, 5 % from other foods, 4% from condiments and only 1% from vegetables. More milk, condiments and other foods were selected by third graders than the average amount offered per child for the entire school. A greater proportion of milk was leftover than any other category of food except condiments. Perhaps an eight ounce serving of milk is more than this age group is able to consume at lunch. Interestingly, the smallest proportion of grain products were leftover. This indicates that the food choices made from this category are well liked. An increase in grain product offerings might be well received.

Table 5

Mean Daily Nutrient Content of One Week's Lunches as Offered to, Selected and Eaten by Third Graders at Troutdale and Glenfair Schools and Amount and Percent of Energy and Each Nutrient Leftover

| | NSLP Standard[1] or accepted recommendation[2] | Lunches as Offered[3] | Lunches as Selected[3] +/- s.d. | Lunches as Eaten[3] | Amount Leftover | % of Selected which was Leftover |
|---|---|---|---|---|---|---|
| Energy (kcal) | > 664 | 695 | 653 +/- 108 | 462 +/- 116 | 191 | 29% |
| Carbohydrate (g) | | 94 | 80 +/- 15 | 59 +/- 15 | 21 | 26% |
| % Kcal CHO | > 55% Kcal | 54% | 49% +/- 6 | 51% +/- 7 | | |
| Protein (g) | > 10 | 28 | 26 +/- 4 | 18 +/- 5 | 8 | 31% |
| % Kcal Protein | | 16 | 16% +/- 3 | 15 +/- 3 | | |
| Total fat (g) | | 26 | 26 +/- 8 | 18 +/- 6 | 8 | 31% |
| % Kcal Total fat | < 30% Kcal | 33% | 36% +/- 6 | 35% +/- 6 | | |
| Saturated fat (g) | | 10 | 10 +/- 3 | 7 +/- 3 | 3 | 30% |
| % Kcal Saturated fat | < 10% Kcal | 13% | 14% +/- 3 | 13% +/- 3 | | |
| Cholesterol (mg)[4] | 100[2] | 42 | 45 +/- 8 | 31 +/- 10 | 14 | 31% |
| Fiber (g)[4] | 8[2] | 5.7 | 4.4 +/- 1.5 | 3.1 +/- 1.2 | 1.3 | 30% |
| Vitamin A (RE) | > 224 | 434 | 395 +/- 347 | 280 +/- 290 | 115 | 29% |
| Vitamin C (mg) | > 15 | 41 | 33 +/- 21 | 22 +/- 14 | 11 | 33% |
| Calcium (mg) | > 286 | 465 | 487 +/- 111 | 314 +/- 121 | 173 | 36% |
| Iron (mg) | > 3.5 | 3.7 | 3.4 +/- 0.8 | 2.5 +/- 0.8 | 0.9 | 26% |
| Sodium (mg)[4] | 800[2] | 1162 | 1064 +/- 209 | 750 +/- 206 | 314 | 30% |

[1]NSLP Standards (Federal Register, 1995). Standards for cholesterol and sodium intake (National Research Council 1989). Standard for fiber intake (American Diabetes Association, 1994).

[2]Standards for cholesterol and sodium intake (National Research Council 1989). Standard for fiber intake (American Diabetes Association, 1994).

[3]Nutrient content of lunches as offered during one week at Glenfair and Troutdale Schools was analyzed using Nutrikids software. The data were averaged over the five days of the week. The nutrient content of each food in a category was weighted by its proportion of the total foods in that category offered that day. Nutrient content of lunches as selected and eaten by third graders was analyzed using the Food Processor nutrient analysis software (ESHA Research). Data for individual foods were compared to assure that nutrient values were the same in both databases. Data were analyzed using SPSS mainframe software.

[4]The NSLP has not established standards for these nutrients but has requested that they be monitored in school lunches.

**Objective 5:** Determine the nutrient content (for energy and nutrients in Objective 1 above) of meals selected and consumed by third graders under the FPCM system.

Table 5 shows that the lunches offered at Glenfair and Troutdale Elementary Schools during the week did not meet the NSLP recommendations for proportion of energy from fat and saturated fat but met or exceeded the recommendation for all micronutrients. Compared to the average percent of energy from fat and saturated fat in the lunches planned by 23 Oregon FPCM schools (Table 1) these lunches were slightly higher in fat and somewhat higher in saturated fat. It should be remembered that meals as planned include overestimates of amounts to be served, especially of entrees. The researchers noted during our week of recording that a large number of entrees were prepared in excess of those served. This might account for these somewhat high numbers.

Third graders selected lunches which provided more than 75% of the amount of each nutrient which was offered. Lunches selected were lowest in fiber (78% of offered), vitamin A (89% of offered) and vitamin C (83% of offered) compared to amounts in lunches offered. These nutrients are highest in fruits and vegetables which indicates children selected slightly less of these foods than other food categories. Table 4 shows that only 61% of third graders selected vegetables. Third graders also selected lunches with about 10% more of their energy from fat, saturated fat and cholesterol and about 10% less of their energy from carbohydrate than in the lunches as offered. Third graders also selected lunches containing slightly more calcium than the lunches as offered. This is possible since these lunches were planned for the entire elementary school but only lunches selected and eaten by third graders were recorded. Perhaps third graders selected milk more universally than did children in some other grades.

Third graders ate an average of 462 kcal from lunches. This is only about 70% of the NSLP standard and only 66% of energy offered per child. Only about 63% of the carbohydrate offered was eaten while 70% of the total fat and saturated fat and 75% of the cholesterol offered were eaten. This may reflect selective eating of the meat and cheese components of entrees. All micronutrients, except iron, as eaten, met the NSLP standards. Only 69% of the recommended iron was eaten from lunches. The average amount of sodium eaten from lunches (750 mg) was within what most would consider recommended guidelines, although the amount offered was considerably higher. This may reflect the low 42% of third graders who selected condiments.

The data in Table 5 suggest that lunches with less than 30% kcal from fat and 10% kcal from saturated fat would have to be offered in order for third graders to not eat more fat in their lunches than recommended levels. They also suggest that menu items rich in iron should be served often. In lunches as selected and as eaten, entrees (average 1.9 mg as selected and 1.4 mg as eaten ) and grains (average 0.7 mg as selected and 0.5 mg as eaten) contributed most to the iron content of lunches. Entrees rich in iron could be encouraged. Since many schools fell short of the recommended number of grain servings, this is another area that might be worked on.

Table 5-A compares the % RDA for energy and nutrients eaten from FPCM by 93 Oregon third graders and the energy and nutrient content of lunches eaten by 846 6-10 year olds in the School Nutrition Dietary Assessment Study of 1992 (Devaney et al, 1995). Oregon third graders ate about one-third less energy from their lunches. They ate a greater proportion of that energy from carbohydrate and a little less of it from fat than 6-10 year olds in the SNDAS as well as only 64% of the RDA for protein versus 101% for SNDAS children of the same age . Oregon FPCM third-graders ate more vitamin A but less vitamin C, calcium and iron than SNDAS children as well as much less cholesterol and sodium. These nutrient intake differences appear to reflect the FPCM emphasis on low-meat entrees and low fat varieties of milk. Although SNDAS children reported eating more energy and more of most micronutrients from lunch, Oregon's third-graders ate at least the USDA standard for each micronutrient except iron and came a little closer to meeting the Dietary Guidelines recommendations for fat and saturated fat. Although Oregon's FPCM at Troutdale/Glenfair offered 33% of kcal as fat and SNDAS lunches offered 37% of kcal from fat , the third graders in Oregon ate almost the same proportion of kcal from total fat from their lunches (35% of kcal) as did 6-10 year olds in the SNDAS (36% of kcal). Perhaps there is a level of fat which this age child gravitates toward eating at lunch. In a previous study of fifth graders in Corvallis, OR (Krupin and

Georgiou, 1993) we found that children did not eat all of the fat (only 39% of kcal as fat from lunches offering 43%) from high fat lunches, but did eat very nearly all of the fat (28% of kcal as fat, from lunches offering 29%) from low fat lunches. In both the Corvallis study and the SNDAS children were served a fixed lunch while in the current study children selected from among many choices offered so comparisons can be tentative at best. Further, in the SNDAS, data on lunches eaten were collected by dietary record which is a much less accurate method than the actual measurements of foods selected and eaten which were used in the current study, so these comparisons should be viewed with even more caution.

Table 5-A
Mean Daily Percent of RDA for Energy and Nutrients Eaten by Third Graders from FPCM Lunches Compared with Energy and Nutrients Eaten from Lunches by 846 6-10 year olds in the SNDAS

| | 1/3 RDA for 10 Year Olds | % RDA (or other standard) Eaten at Lunch by 6-10 yr olds in SNDAS[1] | % RDA (or other standard) Eaten at Lunch by Oregon FPCM Third Graders[2] |
|---|---|---|---|
| Energy (kcal) | 664 | 34% RDA | 23% RDA |
| % Kcal CHO | > 55 | 48% of kcals | 51% of kcals |
| Protein (g) | 10 | 101% RDA | 64% RDA |
| % Kcal Total Fat | ≤ 30 | 36% of kcals | 35% of kcals |
| % Kcal Saturated Fat | < 10 | 14% of kcals | 13% of kcals |
| Vitamin A (RE) | 224 | 37% of RDA | 40% of RDA |
| Vitamin C (mg) | 15 | 59% of RDA | 37% RDA |
| Calcium (mg) | 286 | 49% of RDA | 39% RDA |
| Iron (mg) | 3.5 | 38% of RDA | 25% RDA |
| Cholesterol (mg) | ≤ 100 | 26% Recom. Daily | 10% Recom. Daily |
| Sodium (mg) | ≤ 800 | 55% Recom. Daily | 31% Recom. Daily |

[1]Nutrient content of lunches eaten by third graders in the SNDAS were calculated from one 24-hour recall and additional questions about foods selected and eaten at school.
[2]Nutrient content of lunches eaten by third graders eating FPCM in Oregon were calculated from actual measurement of lunches selected and eaten by each child.

**Objective 6**: Determine the percent of plate waste for each category of food selected by third graders, under the FPCM system.

Table 4 shows that between 22 and 38 percent of the food in each category was leftover. The greatest proportions of milk (38%) and condiments (37% ) were left over and the smallest proportions of grain products (22%), fruits (26%), and entrees (28%) were leftover. Since most milk served was nonfat or 1% fat most of the energy leftover from milk was in the form of carbohydrate and the same is probably true for grain products leftover. Third graders ate most of the vegetables they selected although many of them did not select any. They also ate most of the grain products they selected.

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## Appendix A

## List of Schools in Each Food Service Category

| School # | School Name | Code | School District | |
|---|---|---|---|---|
| 01 | Hawthorne Elementary | c-1 | Pendleton | ✓ |
| 02 | Humbolt Elementary | c-2 | Grant | ✓ |
| 03 | M.A. Lynch Elementary | c-3 | Redmond | ✓ |
| 04 | Rose City Park Elementary | c-4 | Portland | ✓ |
| 05 | Liberty Elementary | c-5 | Albany | ✓ |
| 06 | Sunrise Elementary | c-6 | Albany | ✓ |
| 07 | Kalmiopsis Elementary | c-7 | Brookings Harbor | ✓ |
| 08 | Harding Elementary | c-8 | Corvallis | ✓ |
| 09 | Mountain View Elementary | c-9 | Corvallis | |
| 10 | Buxton Elementary | c-11 | Banks | |
| 11 | Prairie City Elementary | cs-2 | Prairie City | ✓ |
| 12 | Alameda Elementary | cs-1 | Ontario | ✓ |
| 13 | Sweetbriar Elementary | cs-3 | Reynolds | ✓ |
| 14 | Evergreen Elementary | cs-4 | Three Rivers | ✓ |
| 15 | Wolf Creek Elementary | cs-5 | Three Rivers | ✓ |
| 16 | Rosevelt Elementary | cs-6 | North Bend | ✓ |
| 17 | Dundee Elementary | cs-7 | Newburg | |
| 18 | David Hill Elementary | cs-8 | Hillsboro | ✓ |
| 19 | W.L. Henry Elementary | cs-9 | Hillsboro | ✓ |
| 20 | Cascade Locks Elementary | s-1 | Hood River | |
| 21 | Westside Elementary | s-2 | Hood River | |
| 22 | Detroit Elementary | s-3 | Santiam Canyon | |
| 23 | Oakland Elementary | s-5 | Oakland | |

## Appendix B

## Samples of Forms for Collecting Question 1 Data

## Food Pyramid Choices Menus Study

## Keeping Records of Food Pyramid Choice Menus and Recipes

Recording Menus as Planned for a five-day week (Monday-Friday)

Daily Menu Record Form

1. Use one form for each day of the week

2. Record the number of lunches planned for the day. This is the number of students you are expecting for lunch, not the actual number who eat lunch.

3. **ENTREES:**
Record each entree planned by name and check ( )whether it is a) a USDA recipe, b) a modified USDA recipe, c) an original recipe, or d) a recipe for an item as purchased. If it is a USDA recipe record the recipe name and number. Record the total amount planned for this day in volume (e.g., cups, quarts, fluid ounces) or weight (e.g., pounds, ounces) or number (e.g. number of sandwiches or number of pizza slices). Give the serving size in volume (e.g. cups or parts of cups, scoop size) or weight (e.g. ounces) or number (e.g. one each, two tacos). Record the number of servings of each entree planned without subtracting leftovers.

Provide a complete recipe on a RECIPE FORM for each entree checked *USDA Modified, Original or As Purchased.* List each specific ingredient (e.g. reduced fat cheddar cheese, 15% fat ground beef, 2% milk, chicken drumsticks with skin). Give the amount of each ingredient by weight (pounds, ounces, grams) raw if the ingredient was raw or cooked if the ingredient was included in the recipe in cooked form. Preparation instructions do NOT need to be included.

For entrees as purchased such as a burrito provide a recipe and nutrient analysis from the manufacturer if available. If no recipe is available provide the components of the food (e.g. flour tortilla, refried beans, yellow cheese, salsa ) or the ingredient label, the serving size in ounces of weight, and the name and address of the manufacturer.

4. **MILK**
Record each kind of milk served. Usually milk will be served in individual containers. Complete the "Amount Planned" "Serving Size" and "Number of Servings Planned".

5. **VARIETY BAR**

A. **FRUITS/VEGETABLES**
Most fruits and vegetables will be in the "As Purchased" category but include recipe information for those which are prepared (e.g. carrot, raisin salad, three bean salad). Record the total amount offered in weight (pounds, ounces, grams), volume (cups, quarts. gallons) or number (e.g., apples, cantaloupes, #10 cans). "Serving Size" and "Number of Servings Planned" can be omitted.

B. **BREADS/GRAINS**
Most breads/grains will be "As Purchased". Provide recipes for those which are prepared (e.g. corn bread, banana nut bread). For breads "Amount Offered" can be number of slices or number of packages each containing a given number of slices. Cereals may be in individual packages. If so, the weights of individual kinds should be given.

C. **CONDIMENTS, SPREADS, DRESSINGS**

Record recipes for any items prepared on site. It is important to specify the exact ingredients whether a recipe is prepared or the product is served "as purchased" (e.g. partially hydrogenated soybean oil, liquid corn oil).

***IMPORTANT NOTE.** Items such as salad dressings are often offered in large containers and the amount offered may not be related to the expected consumption. This is one case in which the amount planned would be the actual amount which disappeared. Suggestions for measuring condiments follow.

Suggested Methods for Measuring Condiments

1. Weighing is the most accurate method of measuring ingredients; encourage the kitchen staff t use a scale if one is available. The full container containing the condiment can be weighed before lunch and weighed again after lunch. The difference is the amount used.

2. Volume measures can also be used; encourage the kitchen staff to use measuring cups or quarts if available. If butter is offered and you don't have a scale, you can place the solid mass in a measuring cup before lunch, fill the cup with cold water, remove the butter, and the amount of water displaced in the cup is the volume of butter offered. Repeat this procedure after lunch with the leftover butter. The difference in the two measures is the amount of butter used.

3. Have the kitchen staff determine the volume of the serving containers. Encourage them to fill the container before lunch and then estimate the amount left in the container after lunch. (i.e. A 16 ounce syrup container is used and filled with catsup. After lunch, one-half of the catsup is left. Therefore, 8 ounces were used).

6. **RECORDING ADULT MEALS**

On the "Recording Adult Meals" form the Food Service Manager should record, for each day, the number of school children's meals planned and the actual number of adults meals served, including which entree each adult selected. This number may have to be an estimate in some cases.

Food Pyramid Choices Menus Study

Recording Menus as Planned

Suggested Methods for Measuring Condiments

1. Weighing is the most accurate method of measuring ingredients; encourage the kitchen staff t use a scale if one is available. The full container containing the condiment can be weighed before lunch and weighed again after lunch. The difference is the amount used.

2. Volume measures can also be used; encourage the kitchen staff to use measuring cups or quarts if available. If butter is offered and you don't have a scale, you can place the solid mass in a measuring cup before lunch, fill the cup with cold water, remove the butter, and the amount of water displaced in the cup is the volume of butter offered. Repeat this procedure after lunch with the leftover butter. The difference in the two measures is the amount of butter used.

3. Have the kitchen staff determine the volume of the serving containers. Encourage them to fill the container before lunch and then estimate the amount left in the container after lunch. (i.e. A 16 ounce syrup container is used and filled with catsup. After lunch, one-half of the catsup is left. Therefore, 8 ounces were used).

## Food Pyramid Choices Menus Study

### Recording Adult Meals

**Week of** _____

For each day of the week you are recording School Lunches as planned, please fill in and the number of children's meals **planned** and the number of adult meals **actually served** separately. Please record the entree slected by each adult.

| Day of Week | Number of Children's Meals Planned | Number of Adult Meals Served | Adult Entrees Selected and How Many of Each | |
|---|---|---|---|---|
| | | | Entree Name | How Many? |
| Monday | | | | |
| Tuesday | | | | |
| Wednesday | | | | |
| Thursday | | | | |
| Friday | | | | |

## Food Pyramid Choices Menus Study

## One-Week (Monday-Friday) Menu Record

## Meals as Planned

NETPRO Trainer_____PhoneNumber_____

School District_____School Name_____

School staff contact person for questions:

Name:_____

Title:_____

Address:_____

Phone Number:_____

Week of _____through_____

Connie Georgiou
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Georgioc@ccmail.orst.edu

## Daily Menu Record Form
## Meals as Planned

**Record for Monday _____(Date)**

**Number of student lunches planned for this day _____**
**Number of adult lunches served this day_____**
**Number of "Milk Only" sold this day_____**

| Menu Item | Recipe Type | | | | | | |
|---|---|---|---|---|---|---|---|
| | USDA Menu No. | USDA Modified Menu No. | Original Recipe Attached | As Purchased Recipe Attached | Amount Planned | Serving Size | Number of Servings Planned |
| Entrees | | | | | | | |
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| Variety Bar | | | | | | | |
| Fruits/Vegetables | | | | | | | |
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## Daily Menu Record Form - Meals as Planned (Continued)

**Record for Monday _____(Date)**

**Number of student lunches planned for this day _____**
**Number of adult lunches served this day_____**
**Number of "Milk Only" sold this day_____**

| Menu Item | Recipe Type | | | | | | |
|---|---|---|---|---|---|---|---|
| | USDA Menu No. | USDA Modified Menu No. | Original Recipe Attached | As Purchased Recipe Attached | Amount Planned | Serving Size | Number of Servings Planned |
| Variety Bar Continued | | | | | | | |
| Breads/Grains | | | | | | | |
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| Condiments/Spreads/Dressings | | | | | | | |
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## RECIPE FORM

**Entree___Milk___Fruit/Veg___Bread/Grain___Condiment/Spread/Dressing ____**

**Recipe Name:_____**

**USDA Modified Recipe:_____ Original Recipe_____ As Purchased Recipe_____**

**Total Number of Servings the recipe makes (Yield)_____**

**Serving Size in Volume or Weight_____ (for ounces specif whether volume or weight)**

| Ingredient Name | Weight Measure *Cooked or raw | Volume Measure *Cooked or raw | Unique Measure i.e. slice, piece, each |
|---|---|---|---|
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## Appendix C

## Sample of Forms for Collecting Question 2 Data

January 23, 1997

To: Dr. Hudson Lasher, Mrs. Julie Moyer, Mrs. Anita Harder, Ms. Potts, Ms. Schacky, Ms. Carner, Ms. Pringle, Ms. Hulett, Ms. Sluyter, Ms. Tuma, Mrs. Georgine Duncan, Ms. Herd, Ms. Hager

From: Connie Georgiou, Ph.D., R.D., Associate Professor

Re: Food Pyramid Choices Menus Study

Thank you very much for agreeing to have the Reynolds School District Troutdale and Glenfair Elementary Schools participate in Oregon's Food Pyramid Choices Menu (FPCM) Study. The Oregon Department of Education, Child Nutrition Division has contracted with OSU's Department of Nutrition and Food Management to conduct this study to learn more about the FPCM offered to and eaten by, elementary school children. The study and its methodology has been approved by the OSU Institutional Review Board to assure protection of human subjects. This fall we collected menus and recipes, as they were planned, for a random sample of 25 elementary schools around the state. We are in the process of analyzing their nutrient content now. Sweetbriar Elementary School was one of those in the sample. In the process of collecting this data, the Reynolds School District was selected as our first choice for the second part of the study which is to analyze the nutrient content of the foods third grade children actually select and eat from their school lunches. This is because the district is doing such an excellent job with the Food Pyramid Choices Menus and since Georgine Duncan is a wonderful person to work with.

Now that Dr. Lasher and the principals of Troutdale (Mrs. Moyer) and Glenfair (Mrs. Harder) Elementary Schools have most kindly agreed to have those schools participate we are ready to move ahead with data collection plans. I have made arrangements with both principals to talk to the third grade teachers in their schools by phone about the project in the next few weeks. We are hoping to visit both schools on Thursday, January 30 to make arrangements for data collection with the principal, the third grade teachers and the food service personnel. On that day we also plan to talk to each third grade class explaining the project and giving each child two informed consent forms - one for them and one for a parent to sign - saying they either will or will not participate in the study. Participation is, of course, entirely voluntary. Two graduate students, Caryl Batdorf and Russ Long are working on this study as their Masters thesis research and they will be leading the data collection operation. Caryl will be meeting with the classes at Glenfair and Russ will be meeting with the classes at Troutdale. During the following week we hope that the teachers can collect the forms and remind children to return them. We are prepared to make available a small incentive (a special OSU pencil) for returning the forms. The incentive is not dependent on participation in the study, just on returning the forms. We think the study will be fun for the students and anticipate that they will be enthusiastic about taking part in it.

During the first week of February we will need to get a list of children participating from each class so we can make tray namecards and organize our data collection forms. Then, we will collect data the entire week of February 10-14. Here is what this will entail. We will bring a team of five or six trained professionals (Oregon Department of Education nutritionists and NETPRO trainers and OSU graduate students) to each school each day of the week. We will spend some time in the kitchen in the morning, weighing and measuring samples of each menu item for the day. During lunch service each of the three all-third grade classes in each school will be expected to go through the lunch line together as a class and sit with their

class (either in their classroom or the cafeteria) during lunch. Each third grader will be given a tray with their own name card on it each day. It will be important for them to use that tray since it will also have a sticker with a number identifying the child on the bottom. We ask that children leave their meal tickets on their tray instead of turning them in at the lunch line. We will remove the tickets when recording the lunches and turn them in. This is for the purpose of being able, later, to know which children have full price lunches and reduced-price or free lunches, for comparisons of lunch consumption. For example, it would be important to know if children with free and reduced-price lunches are hungrier at lunch and eat more than other children. This information, as all other data in the study, will be kept strictly confidential and data from individual children will be identified only by number. Results will be presented only for groups of children, not individuals.

When each child is finished selecting their lunch they will give their tray to one of the researchers who will take it very briefly out of sight (to the kitchen at Troutdale and in the far left hand corner of the cafeteria at Glenfair) to record the foods on it. The child will pick it up again from them. The recording process will take only a few seconds. The children will eat their lunches as usual but when they are finished they will leave their trays on the table (in the cafeteria) for us to remove and measure plate waste or perhaps on a cart outside the classroom door (for classroom eaters).

We will repeat this process each day of the week. Later on, when the data have been analyzed we will make the results available to the school and will come back to tell the participating classes about it if you would like. We will cooperate with you to make the data collection process go as smoothly as possible. We know the project will create a small disruption in the regular pattern of the day but we think we can keep this to a minimum. Again, we thank you very much, in advance, for participating in this important piece of research.

| Food | sample 1 | 2 | 3 | 4 | 5 | AVE |
|---|---|---|---|---|---|---|
| Tamales | | | | | | |
| PB & Jelly | | | | | | |
| Spaghetti | | | | | | |
| Turkey sandwich | | | | | | |
| Sub sandwich | | | | | | |
| Nachos | | | | | | |
| Turkey gravy | | | | | | |
| Ham & Cheese | | | | | | |
| Ravioli | | | | | | |
| Tuna sandwich | | | | | | |
| Burrito | | | | | | |
| Cheeseburger | | | | | | |
| Cheese pizza | | | | | | |
| Pepperoni pizza | | | | | | |
| | | | | | | |
| Garlic Bread | | | | | | |
| White bread | | | | | | |
| Wheat bread | | | | | | |
| Saltines | | | | | | |
| Graham | | | | | | |
| Rolls | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

| ITEM | quantity | trial 1(g) | trial 2 | trial 3 | trial 4 | trial 5 | AVE |
|---|---|---|---|---|---|---|---|
| grapes | 5 ea | | | | | | |
| | 10 ea | | | | | | |
| | 15 ea | | | | | | |
| | | | | | | | |
| | | | | | | | |
| apples | each | | | | | | |
| | | | | | | | |
| | | | | | | | |
| Oranges | each | | | | | | |
| | | | | | | | |
| | | | | | | | |
| pears | each | | | | | | |
| | T | | | | | | |
| | 1/4 cup | | | | | | |
| | | | | | | | |
| Banana | each | | | | | | |
| | | | | | | | |
| | | | | | | | |
| Fruit Salad | tsp | | | | | | |
| | Tbs | | | | | | |
| | 1/4 cup | | | | | | |
| Cranberries | tsp | | | | | | |
| | Tbs | | | | | | |
| | 1/4 c | | | | | | |
| Pineapple | tsp | | | | | | |
| | Tbs | | | | | | |
| | 1/4 c | | | | | | |
| Cupcake | each | | | | | | |
| Sunflower sd | tsp | | | | | | |
| | Tbs | | | | | | |
| | 1/4 c | | | | | | |
| | | | | | | | |
| Ranch | tsp | | | | | | |
| | Tbs | | | | | | |
| | 1/4 c | | | | | | |
| Butter | each | | | | | | |
| | tsp | | | | | | |
| | T | | | | | | |
| Ketchup | tsp | | | | | | |
| | Tbs | | | | | | |
| | 1/4 c | | | | | | |
| Mustard | tsp | | | | | | |
| | Tbs | | | | | | |
| | 1/4 c | | | | | | |
| Salsa | tsp | | | | | | |
| | Tbs | | | | | | |
| | 1/4 c | | | | | | |
| | | | | | | | |
| | | | | | | | |

| ITEM | quantity | trial 1(g) | trial 2 | trial 3 | trial 4 | trial 5 | AVE |
|---|---|---|---|---|---|---|---|
| carrot sticks | each | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| celery sticks | each | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| broccoli | each | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| cauliflower | each | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| beets | each | | | | | | |
| | tsp | | | | | | |
| | Tbs | | | | | | |
| | 1/4 c | | | | | | |
| | | | | | | | |
| | | | | | | | |
| corn | tsp | | | | | | |
| | Tbs | | | | | | |
| | 1/4 c | | | | | | |
| | | | | | | | |
| | | | | | | | |
| salad greens | tsp | | | | | | |
| | Tbs | | | | | | |
| | 1/4 c | | | | | | |
| | 1/2 c | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| mixed veggies | tsp | | | | | | |
| | Tbs | | | | | | |
| | 1/4 c | | | | | | |
| | | | | | | | |
| | | | | | | | |
| green beans | tsp | | | | | | |
| | Tbs | | | | | | |
| | 1/4 c | | | | | | |

SELECTED

# REYNOLDS S.D.

M | T | W | H | F ✓ | NAME | # | F/R | P

| ENTREES | EA |
|---|---|
| Tamales | |
| PB & Jelly | |
| Spaghetti | |
| Turkey Sand | |
| Sub Sand | |
| Nachos | |
| Turkey Gravy | |
| Ham & Cheese | |
| Ravioli | |
| Tuna Sand | |
| Burrito | |
| Cheeseburger | |
| Pepperoni | |
| | |

| MILK | EA |
|---|---|
| 1 % | |
| 2 % | |
| NonFat Choc | |
| | |
| **BREAD** | **EA** |
| Garlic | |
| White Bread | |
| Wheat Bread | |
| Saltines | |
| Graham | |
| Rolls | |

| FRUIT | EA | 1 tsp | 1 T | ¼ c |
|---|---|---|---|---|
| Grapes | | | | |
| Apples | | | | |
| Oranges | | | | |
| Pears | | | | |
| Banana | | | | |
| Fruit Salad | | | | |
| Cranberries | | | | |
| Pineapple | | | | |
| | | | | |
| | | | | |
| **OTHER** | **EA** | **1tsp** | **1 T** | **¼ c** |
| Sunflower sds. | | | | |
| Cupcake | | | | |
| | | | | |

| VEG | EA | 1ts | 1 T | ¼ c | ½ c | ? |
|---|---|---|---|---|---|---|
| Carrots | | | | | | |
| Celery | | | | | | |
| Broccoli | | | | | | |
| Cauliflower | | | | | | |
| Beets | | | | | | |
| Corn | | | | | | |
| Salad Greens | | | | | | |
| Mixed Veggies | | | | | | |
| Green Beans | | | | | | |
| | | | | | | |
| **CONDIMENT** | **EA** | **1ts** | **1 T** | **¼ c** | **½ c** | |
| Ranch | | | | | | |
| Salsa | | | | | | |
| Ketchup | | | | | | |
| Mustard | | | | | | |
| Butter | | | | | | |
| | | | | | | |

# WASTED

A = Ave S= Selected W = Wasted E= Eaten ? =Other Measurement

# TROUTDALE

| M | | T | | W | | H | | F | | NAME | | # | | F/R | | P | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

| ENTR | A | W | E | MILK | A | W | E | FRUIT | A | W | E | VEG | S | W | E |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Tamale | | | | 1 % | | | | Grapes | | | | Carrots | | | |
| PB & Jelly | | | | 2 % | | | | Apples | | | | Celery | | | |
| Spa ghetti | | | | NF Choc | | | | Oranges | | | | Broccoli | | | |
| Turkey Sand | | | | | | | | Pears | | | | Cauliflower | | | |
| Sub Sand | | | | **BREAD** | **A** | **W** | **E** | Banana | | | | Beets | | | |
| Nachos | | | | Garlic | | | | Fruit Salad | | | | Corn | | | |
| Turkey Gravy | | | | White Bread | | | | Cranberries | | | | Salad Greens | | | |
| Ham & Cheese | | | | Wheat Bread | | | | Pineapple | | | | Mixed Veggies | | | |
| Ravioli | | | | Saltine | | | | | | | | Green Bean | | | |
| Tuna Sand | | | | Graham | | | | | | | | | | | |
| Burrito | | | | Rolls | | | | **OTHER** | **A** | **W** | **E** | **CONDIMENT** | **S** | **W** | **E** |
| Cheese burger | | | | | | | | Sunflower sds. | | | | Ranch | | | |
| Peppmi Pizza | | | | | | | | Cupcake | | | | Salsa | | | |
| | | | | | | | | | | | | Ketchup | | | |
| | | | | | | | | | | | | Mustard | | | |
| | | | | | | | | | | | | Butter | | | |

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