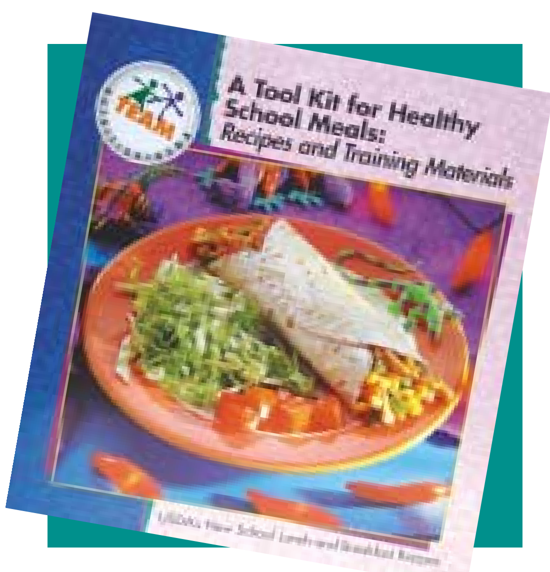
RECIPE STANDARDIZATION PROCESS

Definition

The United States Department of Agriculture (USDA) defines a standardized recipe as one that "has been tried, adapted, and retried several times for use by a given foodservice operation and has been found to produce the same good results and yield every time when the exact procedures are used with the same type of equipment and the same quantity and quality of ingredients" in the manual, *A Tool Kit for Healthy School Meals: Recipes and Training Materials* (p. 37). The terms "quantity recipes" and "standardized recipes" often are confused with each other. Many recipes are written to produce large quantities of food. Any recipe that produces 25 servings or more is termed a quantity recipe. Quantity recipes are not standardized, however, until they have been adapted to an individual school foodservice operation.



Benefits of Standardized Recipes

Using standardized recipes provides many benefits to school foodservice operations. These benefits include:

- **Consistent food quality**—The use of standardized recipes ensures that menu items will be consistent in quality each time they are prepared and served.
- **Predictable yield**—The planned number of servings will be produced by using standardized recipes. This can help to reduce the amount of leftover food if there has been overproduction, and also will help to prevent shortages of servings on the line. A predictable yield is especially important when food is transported from a production kitchen to other serving sites.
- **Customer satisfaction**—Well-developed recipes that appeal to students are an important factor in maintaining and increasing student participation levels. Schools may take a lesson from national restaurant chains that have developed popular menu items consistent in every detail of ingredient, quantity, preparation, and presentation. Standardized recipes provide this consistency and can result in increased customer satisfaction.
- **Consistent nutrient content**—Standardized recipes will ensure that nutritional values per serving are valid and consistent.
- **Food cost control**—Standardized recipes provide consistent and accurate information for food cost control because the same ingredients and quantities of ingredients per serving are used each time the recipe is produced.
- **Efficient purchasing procedures**—Purchasing is more efficient because the quantity of food needed for production is easily calculated from the information on each standardized recipe.
- **Inventory control**—The use of standardized recipes provides predictable information on the quantity of food inventory that will be used each time the recipe is produced.
- **Labor cost control**—Written standardized procedures in the recipe make efficient use of labor time and allow for planned scheduling of foodservice personnel for the work day. Training costs are reduced because new employees are provided specific instructions for preparation in each recipe.
- **Increased employee confidence**—Employees feel more satisfied and confident in their jobs because standardized recipes eliminate guesswork, decrease the chances of producing poor food products, and prevent shortages of servings during meal service.
- **Reduced record keeping**—A collection of standardized recipes for menu items will reduce the amount of information required on a daily food production record. Standardized recipes will include the ingredients and amounts of food used for a menu item. The food production record will only need to reference the recipe, number of planned servings, and leftover amounts.

- **Successful completion of State/Federal reviews**—Standardized recipes are a source of documentation for the School Meals Initiative (SMI) reviews. SMI reviews determine how well schools are meeting the statutory nutrition standards. Schools using a Food-Based Menu Planning System provide a week of menus, recipes, and production records for nutrient analysis by the State Agency. A review cannot be completed if the recipes are missing information or provide inaccurate information on ingredients, yield, or serving size. The Nutrient Standard Menu Planning and Assisted Nutrient Standard Menu Planning Systems also require standardized recipes to ensure that the nutrient analysis is accurate. Menus, recipes, production records, and the nutrient analysis are kept on file for review.

Importance of Standardized Recipes

Three main areas of school foodservice operation are negatively impacted when standardized recipes are not used:

Cost

Nutrients per Serving

Customer Satisfaction

Cost

Recipes are developed with specific ingredient amounts. When additional amounts of ingredients are added to a recipe or recipes are portioned incorrectly, there may be a change in the cost to produce that recipe.

For example, the school foodservice has a recipe for Fiesta Beef Casserole that calls for 35 lb of ground beef to make 200 servings. The Fiesta Beef Casserole recipe is specified to serve 25 portions per pan by cutting a half steam table pan (12" x 10" x 2½") 5 x 5. If a cook uses 40 lb of ground beef (four 10-lb packages), the cost per portion increases significantly because 5 additional pounds of meat were used.

Fiesta Beef Casserole Cost per Serving with 35 lb ground beef	Fiesta Beef Casserole Cost per Serving with 40 lb ground beef	Difference in Cost per Serving of Fiesta Beef Casserole
$0.46	$0.51	+$0.05

While $0.05 per serving may not seem like much, imagine if similar changes were made to one recipe each day during the school year with the same cost impact.

$0.05 per serving x 200 servings x 160 school days = **$1,600**

Suddenly, what seemed like a small addition of a few pounds of meat can become a major cost for the program.

Costs are based on the assumption that a recipe will yield a certain number of servings. The Fiesta Beef Casserole recipe is specified to yield 25 servings per pan by cutting a half steam table pan (12" x 10" x 2½") 5 x 5. What if the pan was cut 4 x 5 and yielded 20 servings instead of 25 servings?

Servings per pan	Cost per serving
20 servings	$0.58
25 servings	$0.46
Difference	+$0.12

$0.12 per serving x 200 servings x 160 school days = **$3,840**

If similar mistakes are made multiple times a day, the costs really add up! Plate waste also may increase when servings are too large; and because a larger portion was served to each student, the likelihood of running out of food increases greatly.

Nutrients per Serving

Besides increases in cost, the nutrients per serving for a recipe can be altered significantly when a recipe is not followed. Take a look at the comparison of nutrient content of a serving of the Fiesta Beef Casserole when cut into 20 versus 25 servings.

Nutrient facts	25 servings per pan	20 servings per pan
Serving size	6.5 oz	8.1 oz
Calories	255	318
Protein	12.7 g	15.9 g
Carbohydrate	22.5 g	28.2 g
Total fat	12.5 g	15.6 g
Saturated fat	5.0 g	6.2 g
Cholesterol	44.0 mg	55.0 mg
Vitamin A	145.0 IU	181.0 IU
Vitamin C	12.2 mg	15.2 mg
Iron	2.3 mg	2.9 g
Calcium	27.3 mg	34.2 mg
Sodium	404.0 mg	506.0 mg
Dietary fiber	1.0 g	2.0 g

Customer Satisfaction

Another very important reason to use standardized recipes is keeping customers happy and satisfied. Standardized recipes provide the same recipe outcome no matter who is preparing them. Production and other staff members can become familiar with the recipes quicker because recipes have the same format. Guesswork is eliminated because staff members have confidence that the recipe will turn out how it is intended. Customers will be more satisfied and participation may increase because customers know what to expect each time a product is served.

Standardized Recipe Components

Standardized recipes for school foodservice operations should always have certain components:

1. **Recipe title**—Name that adequately describes the recipe.

2. **Recipe category**—Recipe classification based on USDA or operation-defined categories, i.e., main dishes, grains/breads.

3. **Ingredients**—Products used in a recipe.

4. **Weight/Volume of each ingredient**—The quantity of each ingredient listed in weight and/or volume.

5. **Preparation instructions (directions)**—Directions for preparing the recipe.

6. **Cooking temperature and time**—The cooking temperature and time, if appropriate.

7. **Serving size**—The amount of a single portion in volume and/or weight.

8. **Recipe yield**—The amount (weight or volume and number of servings) of product at the completion of production that is available for service.

9. **Equipment and utensils to be used**—The cooking and serving equipment to be used in preparing and serving the recipe.

Other Possible Components

10. **Contribution to the Food-Based Menu Planning System**—Identifies the component (meat/meat alternates, vegetables/fruit, and/or grains/breads) the recipe contributes to and is applicable when using Traditional and Enhanced Food-Based Menu Planning Systems.

11. **State/Federal reviews**—State and Federal guidelines may require specific information to be recorded on standardized recipes as documentation for School Meal Initiative reviews.

12. **Nutrient analysis**—Nutrients per serving.

13. **Marketing guide**—Suggested purchase quantities for ingredients that have a preparation loss or gain before they are ready to use in a recipe.

14. Food safety guidelines—Procedures designed to ensure the safe production and service of food. Hazard Analysis Critical Control Point (HACCP) information, if appropriate.

15. Recipe variations—Alternative way of preparing the recipe.

16. Alternative ingredient—Ingredient that could be substituted for a listed recipe ingredient.

17. Optional ingredients—Ingredients that could be added to a recipe to enhance the flavor or acceptability. The addition of these ingredients may affect the nutrient analysis and the contribution of the recipe for food-based menu systems.

Though each school foodservice operation may have its own recipe format, it is important that school foodservice recipes have components 1 - 9. The USDA recipe format can be found in *A Tool Kit for Healthy School Meals: Recipes and Training Materials*. USDA recipes also include a column where managers can record adjusted quantities of the recipe specific to their school foodservice operations.

Phases of Recipe Standardization

School foodservice managers are responsible for serving nutritionally adequate foods while being cost-effective and meeting meal pattern requirements for reimbursement. Using standardized recipes is an essential strategy to help managers accomplish this goal.

The recipe standardization process can be summarized in three phases: recipe verification, product evaluation, and quantity adjustment. Recipe verification consists of reviewing the recipe in detail, preparing it, verifying its yield, and recording changes. Product evaluation focuses on determining the acceptability of the product produced from the recipe. Changing the recipe yield and ingredient amounts occurs in the quantity adjustment phase. A recipe may go through these phases several times before becoming standardized at the necessary quantity for an operation. School foodservice managers and employees should work together on the recipe standardization process. Input from students and other customers is critical during the evaluation phase.

Decisions made during each phase determine the flow of a recipe through this recipe standardization process. Once a recipe has been standardized for an operation, the standardization process should not have to be repeated unless changes occur in availability of ingredients or equipment.

Quantity recipes published by USDA *(A Tool Kit for Healthy School Meals: Recipes and Training Materials*, *Quantity Recipes for School Food Service*, or *School Lunch Challenge I, II, and 97 Recipes*) have been tested in schools already and will require less work to standardize. Decisions with these USDA recipes will involve determining which food(s) to use when options or variations are suggested and which piece(s) of equipment will be used to prepare the product. Recipes that are brought in from home or are taken from magazines likely will require much more time to standardize. Working with home-size recipes usually involves such activities as determining whether the serving size on the recipe is appropriate for the customers for whom it will be served and calculating food-based menu contribution or nutrient content.

Recipe Verification Phase

The first phase of the recipe standardization process is the recipe verification phase. This phase includes four major processes: review the recipe, prepare the recipe, verify the recipe yield, and record changes to the recipe.

Review the Recipe

Begin by working on only one recipe at a time. Review the recipe to be standardized. Look to see if the recipe contains the following information:

1. Recipe title
2. Recipe category
3. Ingredients
4. Weight/volume for each ingredient
5. Preparation instructions (directions)
6. Cooking temperature and time, if appropriate
7. Serving size
8. Recipe yield
9. Equipment and utensils to be used

Reviewing the recipe for this information must be done before preparing the recipe. If information is missing, make note of any information that must be determined during the recipe preparation process. The amount of time needed for this review process will differ, depending on the source of the recipe.

Reviewing a recipe involves several steps. A checklist and decision guide are included in Appendix A (pp. 40 to 43) to assist with this review process. A practice exercise using the checklist also is included in Appendix A (pp. 44 to 47). The steps in the review process include:

1 ***Review recipe title.***
Each recipe should have a title. The title should be descriptive of the product and easily understood by everyone who is working in the operation and your customers. It should be appealing to your customers as well.

2 ***Review the recipe category.***
Recipes often are categorized by type. USDA's most recent school lunch recipe file, *A Tool Kit for Healthy School Meals: Recipes and Training Materials*, uses nine categories for grouping recipes. Those categories are grains/breads, desserts, main dishes, salads/salad dressings, sandwiches, breakfast, sauces and gravies, soups, and vegetables. When standardizing a recipe that is not part of the USDA recipe file, a recipe category should be assigned to facilitate organization of recipes. Using recipe categories makes it easier to locate recipes in a file box or on the computer.

3 ***Review ingredients.***
The ingredient name should be clear so that the name of the product, product type/form (fresh, frozen, canned), and any preparation technique(s) (peeled, grated, minced, diced) are listed. Be sure to indicate size for preparation techniques, such as slicing and dicing (e.g., sliced $\frac{1}{2}$ in., diced $\frac{1}{4}$ in.). If a specific brand of ingredient is used, note the name of the brand. List the ingredients in order of their use in preparing the recipe.

USDA recipes often have optional ingredients or variations included in the recipe. Decisions should be made in advance whether optional ingredients will be included or whether or not a variation of the recipe will be used instead of the main recipe. Care must be taken when substituting ingredients in a recipe since different forms of an ingredient (i.e., fruit packed in juice vs. fruit packed in syrup) may have very different nutrient contents. Reviewing the ingredients will assist in purchasing the proper amount and type of ingredients necessary to make the recipe.

When reviewing the ingredients, take note of items that may need pre-preparation one or more days in advance of service. For example, meats that are delivered frozen would need to be placed in the refrigerator to thaw several days in advance of preparation and service.

4 *Review weight/volume for each ingredient.*

A decision should be made whether weights, volumes, or both will be used to describe the amount of each ingredient needed for the recipe. When reviewing the recipe, if the ingredient quantity is not in the preferred weight or volume, conversions will need to be made before the recipe can be prepared. A table of weight and volume conversion is included in Appendix B (pp. 50). Avoid using packaging to describe the amount of a product, such as "1 package." Products can be packaged a number of ways and package size can vary depending on supplier. The amount of product in each package may vary depending on the product quality. Quantities should be listed in the easiest unit of measure (i.e., 1 lb 4 oz instead of 20 oz, ½ cup instead of 8 Tbsp). Standard abbreviations for units of measure should be used. A list of abbreviations for weights and volumes commonly used in foodservice is included in Appendix B (p. 50).

Ingredients included in a recipe may be listed as the as purchased (AP) or edible portion (EP) quantity. When fresh fruits and vegetables are processed, there is a loss in yield. This loss occurs because fresh items often have to be peeled and/or trimmed before they are ready for use in a recipe. The EP amount of fresh fruits and vegetables usually is less than the AP quantity. The USDA *Food Buying Guide for Child Nutrition Programs* provides yield information to assist with determining EP quantity of fresh fruits and vegetables.

For raw meats, the cooked EP amount of meat always is less than the raw AP quantity because moisture and fat are lost in the cooking process. Thus, the yield on meats that are cooked in an operation always is less than 100%. The yield of precooked or processed meats usually is at or near 100%, as no loss in cooking occurs. The USDA *Food Buying Guide for Child Nutrition Programs* provides yield information to assist with determining EP quantity of meat items in a recipe. Component credit will be calculated based on information in the USDA *Food Buying Guide for Child Nutrition Programs.*

For rice and pasta, the cooked quantity (both in volume and weight) is more than the dry quantity because water is absorbed in the cooking process. Thus, the yield on rice and pasta is greater than 100%. The USDA *Food Buying Guide for Child Nutrition Programs* provides yield information to assist with determining EP quantity.

When listing ingredient quantities in a recipe, remember that an ounce measurement may be either volume or weight. Ounce in volume is referred to a fluid ounce (fl oz); ounce in weight is termed ounce (oz). One cup = 8 fl oz of volume, but 8 fl oz of different foods varies in weight. (For example, 1 cup [8 fl oz] of apple cider = 8.7 oz in weight, 1 cup [8 fl oz] of chocolate pudding = 10.1 oz in weight.)

5 *Review preparation instructions (directions).*

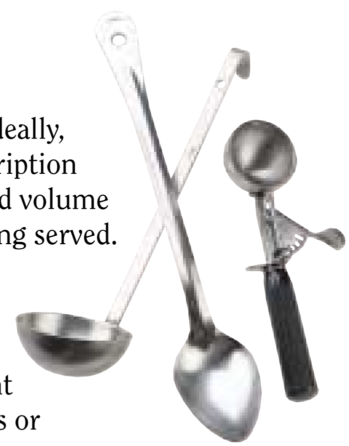
Detailed instructions should be included with each recipe to indicate how ingredients are to be combined. The directions should list, in order, the steps to be followed in preparing the recipe. Food safety guidelines, such as proper thawing, internal cooking, holding, serving, and storage temperatures, should be included in the directions to help ensure that the final product will be safe to eat.

All preparation and cooking terms should be reviewed to make sure staff members understand exactly what each means. If the correct procedures are not used, the final product will not be correct. Refer to the Glossary (pp. 31–33) for explanations of common terms used in recipes.

6 *Review cooking temperature and time.*

Cooking temperature and time should be identified on the recipe. Adjustments may be needed in the cooking temperature and time, depending on the equipment used to prepare the food.

The final internal temperature also should be identified. Specifying a final internal temperature for the product will ensure that products are cooked to the safe and proper degree of doneness. The most recent Food and Drug Administration (FDA) *Food Code* provides guidelines for cooking temperatures and times and final internal temperatures.



7 *Review serving size.*

The size of an individual serving should be listed on the recipe. Ideally, the weight of one serving will be identified in addition to a general description of serving size such as $\frac{1}{2}$ cup or $\frac{1}{8}$ pie. When possible, list the weight and volume of the serving. Assess whether serving size is appropriate for the age being served.

8 *Review recipe yield.*

Recipe yield refers to the amount of product that will be obtained when preparing a recipe. Recipe yield should be identified in total weight and/or volume, as well as a more general description such as 25 servings or 4 (12” x 20” x 4”) pans.

9 *Review equipment and utensils to be used.*

School foodservice kitchens come equipped with a variety of pieces of equipment. Often, different pieces of equipment can be used to achieve the same outcome. For example, a convection or conventional oven can be used for baking a casserole; a steamer, steam-jacketed kettle, or oven could be used for cooking rice or pasta. When reviewing a recipe, the exact piece(s) of equipment to be used for preparation and cooking the product should be identified.

The capacity of cooking equipment needs to be considered. For example, 1,000 rolls may need to be made, but if the mixer capacity will not hold that quantity of ingredients, then the recipe will need to be adjusted in batches that can be made in that mixer.

Cooking time and temperature should be determined for the specific piece of equipment that will be used to prepare the recipe. Pans to be used for cooking the product should be identified. The length, width, and depth of steam table pans should be included. The utensil(s) to be used for portioning and/or serving the product also should be listed on a recipe.

Prepare the Recipe

Once the recipe has been reviewed, it can be prepared. The USDA *A Tool Kit for Healthy School Meals: Recipes and Training Materials* recommends making the first version of the recipe to yield 25 servings. Throughout the process of making the recipe, keep careful notes about any variations. Record this information directly on the recipe for future reference. Cooking time to reach the internal temperature and product quality may vary slightly depending on the type and age of equipment.

Verify Yields

"Verify yields" includes verifying ingredient, recipe, and serving yields. When verifying a recipe, the AP quantity needed to yield the necessary EP quantity of an ingredient must be determined. Yields can vary depending on factors such as product quality, preparation techniques, and cooking times and temperatures. The USDA *Food Buying Guide for Child Nutrition Programs* contains ingredient yield information. Products from different manufacturers may differ in quality, and these quality differences may affect yield of the product. If great variation in ingredient yield occurs, school foodservice directors will need to work with their vendors to make sure product specifications are being met.

Verification of the recipe yield occurs once all of the ingredients have been combined and the recipe preparation completed. The yield can be determined several ways depending on the recipe. Recipe yield should be specified in both total quantity (weight and/or volume) and number of servings. Recipe yield can be determined by weighing the final product or measuring its volume.

The weight of a serving is determined by taking the weight of the total final product and dividing by the number of servings the recipe makes. Guidelines for portioning the product into individual servings should be given on the recipe. A serving utensil should be identified for each product. Weights of these actual servings should be compared to the calculated serving weight to ensure portioning is being done correctly. If the desired serving size is not achieved when verifying the yield, changes in the recipe, portioning, or ingredient amounts may be needed.

Record Changes

Notes of any changes or concerns should be recorded on the recipe during the verification phase. The format of the permanent recipe varies among operations. USDA recipes, such as those found in *A Tool Kit for Healthy School Meals: Recipes and Training Materials*, provide an excellent format for recipes. The more detailed the information is on the recipe, the more assurance of having a consistent quality product. Once the recipe verification phase has been completed, the recipe is ready for the next phase of the standardization process, the product evaluation phase.

Product Evaluation Phase

Product evaluation follows the recipe verification phase and is an important part of the recipe standardization process. It will help determine acceptability of the recipe and will provide objective information that can be used to further improve the recipe. Recipe evaluation should include the manager, foodservice staff members, and customers (can include students, teachers, administrators, and parents). Two types of evaluation occur in the evaluation phase: informal and formal.

Informal Evaluation

Informal evaluation involves only the school foodservice managers and employees. During informal evaluation, the product is prepared for the first time in the operation and an assessment is made of whether efforts to standardize the recipe should continue. A checklist is included in Appendix C (p. 52) to assist in the informal evaluation.

Three decisions are possible as a result of the informal evaluation of a recipe. First, if the product was found to be totally unacceptable based on several of the informal evaluation criteria, the decision may be made to discontinue any further work on standardizing the recipe. If most of the informal evaluation criteria were rated as acceptable, the recipe may go back to the verification phase to allow for changes to be made to the recipe and a new version of the recipe prepared. Finally, if all evaluation criteria were rated as acceptable in the informal evaluation, then the recipe may be prepared for formal evaluation.

Formal Evaluation

Formal evaluation occurs when the foodservice staff believes a recipe has potential for service in their operation. Procedures for conducting a formal evaluation of the recipe include:

1 *Select a group(s) of people to taste the sample recipe.*

School foodservice staff members, students, and other customers should evaluate recipes during the formal evaluation of the recipe. Keep the group size manageable when evaluating a recipe. Usually 10 or fewer people should sample a food item at a given time.

2 *Choose an evaluation form.*

The evaluation form used should be appropriate for the age of the group members who are sampling the food items. It should address the questions the school foodservice manager and employees want answered, be easy for the evaluators to read and complete, and should provide the information needed to adequately evaluate the product. Two sample evaluation forms are included in Appendix C (pp. 53-54) of this manual. One was developed for use with older students and staff members, and the other for younger children. Evaluation forms designed for specific food products can be obtained from the National Food Service Management Institute's (NFSMI) *Culinary Techniques for Healthy School Meals* training modules. When developing an evaluation form, consider: (1) what questions need to be answered, (2) who will fill out the form, and (3) how the results will be tallied. Here are some situations that may be encountered.

Situation 1: A new recipe for Vegetable Lasagna is being developed. Typically, foodservice staff members will first evaluate the lasagna. If staff members believe the product is acceptable, then students and other customers will be asked to evaluate it. The manager will need to decide what attributes should be evaluated. For this example, assume that the manager would like to have input from staff members on three major attributes: (1) Is the appearance acceptable? (2) Will the taste be well liked? and (3) Is the product moist enough? In this example, the manager is most interested in evaluations of appearance and moistness because, in the past, students have complained about the noodles being hard and looking overcooked on the top of the lasagna currently served. The foodservice staff evaluation form included in Appendix C (p. 53) could be used to evaluate these attributes. The manager might set criteria for acceptance of a recipe, such as expecting a score of 4 or 5 in the areas of acceptability and moistness (texture) for the recipe to be considered.

Situation 2: A low-fat recipe for Chocolate Cake is being considered for an elementary school. The product has been prepared and was evaluated positively by school foodservice staff members. The younger student evaluation form, included in Appendix C (p. 54), could be used to get comments from the elementary students on the product.

3 *Prepare the sample recipe.*

Once a group has been selected to sample the product(s) and an evaluation form has been selected, the recipe can be prepared for evaluation. Typically, recipes for sampling are made in small quantities such as for servings of 25.

4 *Set up the sampling area.*

The area to be used for sampling should be prepared with drinking water, eating and serving utensils, napkins, evaluation forms, and pens or pencils. If more than one food item is being evaluated, evaluators should be provided with unsalted soda crackers to nibble between foods. The cracker will help prevent flavor carryover from the first food. Seat evaluators apart to prevent them from talking with each other during the evaluation and influencing the ratings.

Frequently, students cannot be released from class to sample and evaluate recipes. The school foodservice manager may want to set up a separate testing area in the dining room and have students evaluate products during their meal period.

5 *Have participants taste and evaluate the food.*

Tasting procedures should be explained to those who will be evaluating the product, and the evaluation form should be reviewed with them prior to tasting. Remind evaluators of the importance of not making verbal comments about the food during the tasting. If asking for an evaluation of qualities such as moistness and/or temperature, explain what these terms mean.

6 *Summarize the results.*

The evaluation form used will help determine the way results are summarized. The evaluation form in Appendix C (p. 54) for elementary students requests “yes,” “no,” and “don’t know” answers. Thus, the summary when using this evaluation form will be the number of “yes” responses as compared to the number of “no” responses. The other evaluation form included in Appendix C (p. 53) allows for evaluators to circle a number related to their rating of the product. Both a total score (sum of each numeric rating) and mean score (average of the numeric ratings) can be determined for each evaluator. Space is provided on the evaluation form to record these scores. Evaluator’s ratings can be combined in several ways. A form for summarizing these ratings is included in Appendix C (p. 55). An average rating for each attribute (appearance, taste, etc.) can be calculated. An overall average total score (average of total scores from all evaluators) and an overall average score (average of mean scores from all evaluators) also can be calculated. These average scores can be compared to an operation’s preset minimum scores for a product and to the scores of other recipes.

Appendix C (pp. 56-58) contains samples of completed evaluation forms for the Vegetable Lasagna example. Evaluation ratings of individual attributes as well as the total score and mean score are included. The total score for Evaluator #1 (Appendix C, p. 56) was 21. The total score was calculated by adding the ratings for each attribute together ($4 + 5 + 5 + 3 + 4 = 21$). The mean score for Evaluator #1 was 4.2. This score was calculated by dividing the total score by the number of attributes evaluated ($21 \div 5 = 4.2$). A score for each attribute (i.e., appearance, taste) would be calculated by adding the attribute ratings given by each evaluator and dividing that sum by the number of evaluators (in the example, texture received ratings of 3, 4, 3; its mean score would be $[3 + 4 + 3] \div 3 = 3.1$). A completed Evaluation Summary Form is included in Appendix C (p. 59), showing the three individual evaluator ratings and the summarization scores based on these ratings.

When evaluating a product, the total score, mean score, and individual attribute ratings should be reviewed. An evaluator’s total score may be relatively high yet one attribute may be rated very low or lower than the other rated areas. When looking at the average scores by three evaluators of the Vegetable Lasagna (4.2, 4.8, 3.8), the overall evaluation scores are acceptable. However, when reviewing the attribute ratings, the area of "texture (moistness)" has been consistently rated lower than all other areas (mean score = 3.1). Since moistness was of particular concern with this product, the manager might want to continue to work with the recipe to try to improve its texture (moistness).

7 *Determine future plans for the recipe based on evaluation results.*

Based on the formal evaluation results, the recipe will be accepted as is, rejected, or changed. If the formal evaluation comments are positive and the recipe is accepted as is, no further changes in ingredients will be needed. At this point a decision is made on whether the recipe is in the correct quantity or not. If a different yield is needed, the recipe moves to the quantity adjustment phase of the recipe standardization process. If no additional quantity adjustment is needed, the recipe is considered standardized. If the evaluation comments are very poor, the recipe likely will be rejected and no further work will be done to standardize it for an operation. If the evaluation comments were neither very good nor very poor, additional work on the recipe may be needed. This likely would mean that the recipe would go back through the verification phase with changes being made to ingredients, preparation instructions, or cooking procedures.

For example, the three sample evaluations of Vegetable Lasagna in Appendix C (pp. 56-58) indicate a possible concern for the moistness of the product. Moistness was identified as an area of concern before the evaluation was conducted. Since the evaluations of texture for the product were not very positive, the next step would be to review the recipe and preparation procedures. Maybe the lasagna was slightly overcooked and a shorter cooking time may improve the overall "moistness" of the lasagna. Once a way to improve the product has been identified, the change can be implemented and the product remade and evaluated again.

Quantity Adjustment Phase

When a recipe has been evaluated positively in the evaluation phase but is not in the desired quantity, it would move to the quantity adjustment phase of recipe standardization. There are several methods that can be used to adjust a recipe to get to the desired number of servings (yield). Some methods are done manually; others involve use of the computer.

Table 1: Comparison of Standardized Recipe Adjustment Methods

Method	Advantages	Disadvantages	Initial Recipe	Final Recipe
Factor method	◆ Can be used for any recipe ◆ Easy to use	◆ Math skills required	◆ Can start with any recipe and desired yield	◆ Final recipe can yield any number of servings desired
Direct reading tables method	◆ Minimal math skills needed	◆ Direct reading tables must be available ◆ Must know how to read tables ◆ Can only be used for yields in multiples of 25	◆ Must have yield of 25 servings or multiples of 25 servings	◆ Yield of 25 servings or multiples of 25 servings (i.e., 200, 175, 500)
Percentage method	◆ Further adjustments to a single recipe are easy after initial ingredient percentages are calculated	◆ Many steps in process ◆ Math skills required ◆ Must use weights for all ingredients ◆ Must calculate and adjust for handling loss	◆ Can start with any recipe and yield ◆ Initial recipe ingredients must be in weights	◆ Yield can be any amount desired ◆ All final ingredients are in weights
Computerized recipe adjustment	◆ Adjustments easy after recipe entered on computer ◆ No math skills needed	◆ Computer programs can be expensive ◆ Some programs require ingredients to be entered in weights only ◆ Ingredient quantities may be listed in decimals	◆ Can start with any recipe and desired yield	◆ Final recipe can yield any number of servings desired

As shown in Table 1, there are advantages and disadvantages to each method. The decision of which method is used is usually made by the foodservice director based on resources available and needs of the foodservice operation. Recommendations in *A Tool Kit for Healthy School Meals: Recipes and Training Materials* suggest first making a recipe for 25 servings and then reproducing at 50 and 100 servings before increasing the recipe to the quantity needed.

Factor Method of Recipe Adjustment

The factor method for adjusting recipes involves mathematical calculations and is the most commonly used method of manual adjustment. Additional information related to using the factor method can be found in *A Tool Kit for Healthy School Meals: Recipes and Training Materials* and *Quantity Recipes for School Food Service*. The factor method consists of three basic steps. They are:

1 *Determine the "factor" to be used.*

The factor is a multiplier that will be used to increase or decrease the quantity of ingredients in a recipe. The factor is determined by dividing the desired yield (in number of servings) by the current recipe yield (in number of servings).

Desired yield ÷ Current yield = Factor

For example, if a manager wishes to make 250 servings and the current recipe produces 100 servings, divide 250 by 100; the factor would be 2.5.

250 ÷ 100 = 2.5

2 *Multiply each ingredient quantity by the "factor."*

Each ingredient quantity in a recipe is multiplied by the factor to determine the ingredient quantity needed to produce the new yield. Ingredient quantities given as fractions would need to be converted to decimals prior to doing this calculation. Appendix D (p. 62) contains a fraction-to-decimal conversion chart. In addition, school foodservice managers may find it easier to convert quantities that are in multiple units (i.e., quarts and cups) to one unit (cups) before doing calculations.

For example, if the goal is to make 250 servings and the base recipe yields 100 servings, the "factor" would be 2.5. If the original recipe calls for ½ cup lemon juice, 8 oz sour cream, and 1 Tbsp + 1 tsp chopped parsley, the math is as follows:

Lemon juice:	.5 cup	x	2.5	=	1.25 cups lemon juice
(original amount)	x		(factor)	=	(amount needed for 250 servings)
(Note: Change ½ cup to the decimal .5 before calculating.)					
Sour cream:	8 oz	x	2.5	=	20 oz sour cream
(original amount)	x		(factor)	=	(amount needed for 250 servings)
Parsley:	4 tsp	x	2.5	=	10 tsp parsley
(original amount)	x		(factor)	=	(amount needed for 250 servings)
(Note: Change 1 Tbsp + 1 tsp to all tsp [4] before calculating.)					

4 *Change amounts into more common measurements.*

Often, the result of the mathematical calculations is a quantity that is hard to measure or not commonly used. These quantities may need to be converted to a more common measurement. Rounding to the nearest common measure also may occur. Use tables found in Appendix D (pp. 62-63) to assist with such conversions.

For example:
The lemon juice is listed as 1.25 cups; the more common measurement would be 1¼ cups.
The sour cream could be changed to 1 lb 4 oz (or 1.25 lb) for easier measurement.
(Note: 16 oz = 1 lb)
The quantity of parsley might be changed to 3 Tbsp + 1 tsp for ease in measuring.

Information for Adjusting Recipes

Be aware that several categories of ingredients require special attention when adjusting recipes because the amount needed for these ingredients often does not increase proportionately to the increase in other ingredients. Ingredients that may not increase proportionately include herbs/spices, leavening agents (baking soda, baking powder, yeast), thickening agents (flour, cornstarch, eggs), and liquid (water, juice). Factors such as exposed surface area, evaporation, and handling loss can change the total amount needed of an ingredient when the recipe quantity is changed. In some cases, additional amounts of a product are needed; in others less is needed. Only by preparing the recipe and evaluating the product can a determination of changes needed be made. The text, *Food for Fifty*, provides information on the proportion of ingredients such as leavening agents, seasonings, thickening agents, and gelatins that could be used in a recipe.

Other factors also need to be considered when adjusting recipe quantities. The quality of some food items, such as meringues, may deteriorate when too large a quantity is produced at one time. Size of equipment will impact the batch size of a recipe as well. For example, if 60 gallons of soup are needed, but the institution has only a 50-gallon steam-jacketed kettle in which to make the soup, adjusting the recipe to 30 gallons and preparing two batches is preferable.

Practice Exercises for Factor Method of Recipe Adjustment

Example #1:

For the Cream of Chicken Soup recipe below, determine the amount of each ingredient needed to make 175 servings.

Cream of Chicken Soup **Desired Yield:** 175 **Current Yield:** 50 **Factor:** _____

Ingredients	50 Servings (Recipe Amount)	Converted Quantities	Factor	175 Servings (Calculated Amount)	175 Servings (Common Measure)
Margarine	12 oz				
Flour	2½ cups				
Chicken stock	2 qt + 2 cups				
Milk, low fat	2 gal + 2 qt				
Cooked chicken	3 lb 2 oz				

Example #2:

For the Broccoli Salad recipe below, determine the amount of each ingredient needed to make 225 servings.

Broccoli Salad **Desired Yield:** 225 **Current Yield:** 100 **Factor:** _____

Ingredients	100 Servings (Recipe Amount)	Converted Quantities	Factor	225 Servings (Calculated Amount)	225 Servings (Common Measure)
Fresh broccoli	13 lb 8 oz				
Mayonnaise	2 qt				
Sugar	2 lb				
White vinegar	½ cup				
Milk, low fat	⅓ cup				
Walnuts, chopped	1 qt 3½ cups				

Answer Key Practice Exercises for Factor Method of Recipe Adjustment

Example #1

Cream of Chicken Soup **Desired Yield: 175** **Current Yield: 50** **Factor: 3.5**

Ingredients	50 Servings (Recipe Amount)	Converted Quantities	Factor	175 Servings (Calculated Amount)	175 Servings (Common Measure)
Margarine	12 oz	12 oz or .75 lb	3.5	42 oz or 2.62 lb	2.62 lb or 2 lb 10 oz
Flour	$2\frac{1}{2}$ cups	2.5 cups	3.5	$8\frac{3}{4}$ cups	$8\frac{3}{4}$ cups
Chicken stock	2 qt + 2 cups	10 cups	3.5	35 cups	2 gal + 3 cups
Milk, low fat	2 gal + 2 qt	10 qt	3.5	35 qt	8 gal + 3 qt
Cooked chicken	3 lb 2 oz	3.125 lb or 50 oz	3.5	10.94 lb or 175 oz	10.94 lb or 10 lb 15 oz

Review of Steps Using the Factor Method

Step 1: Determine the "factor" to be used.

Remember, the factor is determined by dividing the desired yield in servings (175) by the current yield in servings (50).

$175 \div 50 = 3.5$

Step 2: Multiply each ingredient quantity by the "factor."

When recipe quantities are given as two units of measurement, managers will find it easier to calculate the new yield if the entire recipe quantity is converted into the smaller of the quantities given. Fractions should be converted to decimals. For example, the Cream of Chicken Soup recipe uses $2\frac{1}{2}$ cups of flour; converting the $\frac{1}{2}$ to the decimal .5 (see Appendix D, p. 62) should be done before further calculations are made. The recipe also uses 2 qt and 2 cups of chicken stock. Converting this quantity to all cups (10 cups) (see Appendix B, p. 50) and then multiplying by the factor will be much easier than multiplying the 2 qt by the factor and the 2 cups by the factor and then combining these new quantities. The quantity of cooked chicken is listed in pounds and ounces. Converting the ounces to a decimal part of a pound (see Appendix D, p. 63) or to all ounces (1 lb = 16 oz) will simplify this math.

Step 3: Change amounts into more common measurements.

After multiplying by the factor, ingredient quantities may need to be converted into more common measures. For example, the mathematical calculations in Step 2 indicated 35 cups of chicken stock would be needed for 175 servings. Using the information in Appendix B (p. 50), the 35 cups can be converted to a more common measure: 2 gal and 3 cups (i.e. 35 cups = 8 qt and 3 cups; 8 qt = 2 gal). Decimal parts of a pound, such as the results for margarine and cooked chicken, could be converted back to pounds and ounces, if needed (see Appendix D, p. 63). For example, the 42 oz of margarine divided by 16 (oz in a lb) results in the more common measure of 2.62 lb. If using a scale that measures in pounds and ounces, the .62 lb can be converted to 10 oz (see Appendix D, p 63).

Example #2:

Broccoli Salad **Desired Yield: 225** **Current Yield: 100** **Factor: 2.25**

Ingredients	100 Servings (Recipe Amount)	Converted Quantities	Factor	225 Servings (Calculated Amount)	225 Servings (Common Measure)
Fresh broccoli	13 lb 8 oz	13.5 lb	2.25	30.375 lb	30 lb 6 oz
Mayonnaise	2 qt	2 qt	2.25	4.5 qt	4 qts + 1 pt
Sugar	2 lb	2 lb	2.25	4.5 lb	4 lb 8 oz
White vinegar	½ cup	.5 cup	2.25	1.125 cups	1 cup + 2 Tbsp
Milk, low fat	⅓ cup	.333 cup	2.25	.759 cup	¾ cup
Walnuts, chopped	1 qt + 3½ cups	7.5 cups	2.25	16.875 cups	4 qt + ⅞ cup

Review of Steps Using the Factor Method

Step 1: Determine the "factor" to be used.
Remember, the factor is determined by dividing the desired yield in servings (225) by the current yield in servings (100).

225 ÷ 100 = 2.25

Step 2: Multiply each ingredient quantity by the "factor."
Several conversions could be done before multiplying to simplify the math. For example, the 13 lb 8 oz of fresh broccoli could be converted to 13.5 lb (see Appendix D, p. 63); the ½ cup of white vinegar could be converted to .5 cup (see Appendix D, p. 62).

Step 3: Change amounts into more common measurements.
Once the new quantities have been calculated, conversion to more common measures may be needed. For example, if an operation weighs ingredients in pounds and ounces, the 30.375 lb of fresh broccoli could be converted to 30 lb 6 oz (see Appendix D, p. 63). Some calculations may need to be rounded to the next closest unit. The calculations for milk indicated that .759 cup was needed; using information on converting fractions to decimals found in Appendix D (p. 62), this amount would be closest to ¾ cup.

Computerized Recipe Adjustment

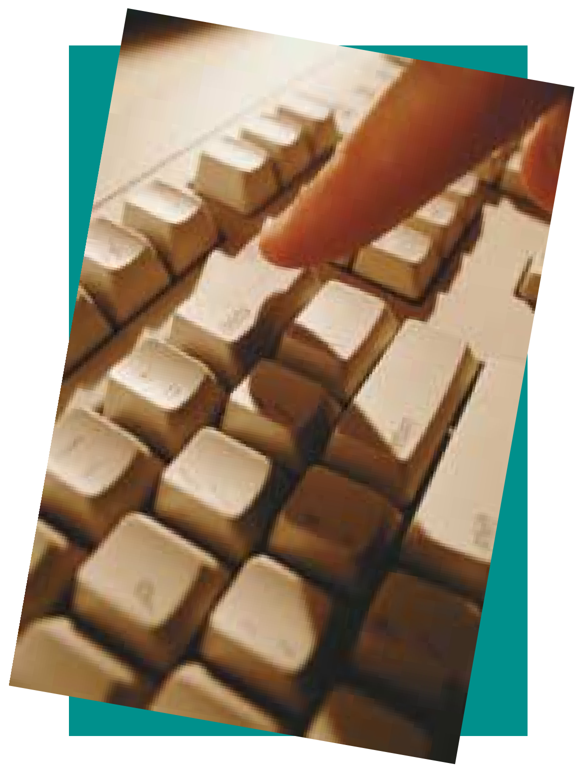
Another way recipes can be adjusted is using computer software. The manual ways of adjusting recipes can be very time consuming depending on which method is used, the length of the recipe, and its complexity. Computer software packages use one or more of the manual methods of adjusting recipes as the basis for their programming.

The CD-ROM included in these training materials contains a *Recipe Adjuster* that can be used to quickly perform the math calculations involved in recipe adjustment. The factor method is used in this program for adjusting recipe quantity.

USDA has approved several nutrient analysis software programs for use in school foodservice operations (see http://schoolmeals.nal.usda.gov:8001/software/index.html). Many of these software programs also can perform recipe adjustment. These software programs are designed to meet the requirements of school foodservice operations and may include menu planning; recipe and menu analysis; recipe adjustment; weighted or unweighted nutrient analysis; food production, service, and calendar reports; nutrition label data conversion; and age/grade-specific nutrient standards for Food-Based and Nutrient Standard Menu Planning Systems, in addition to nutrient analysis.

Benefits of using computerized recipe adjustment programs include:

- Recipe adjustment is done much faster and more accurately, especially when different portion sizes are served to various age/grade students.
- Menu planning is more flexible because menus can be analyzed and modified easily.
- Food information is specific to school foodservice programs.
- Menus can be analyzed and evaluated for specific nutrients.



Disadvantages of computerized recipe adjustment programs include:

- Computer hardware and software can be expensive.
- Some programs require all ingredients to be entered as weight.
- Some programs will not round the adjusted quantity and thus may give unrealistic measurements, such as 40 lb + 1 oz.
- Time and resources will be needed to enter all current recipes and train employees on software use.

When using software programs for adjusting recipes, the following questions should be considered:

- Does the program allow printing of recipes in a format that is usable by foodservice staff members?
- Will the program adjust the recipe for various portion sizes for various age/grade groupings?
- Does the program allow the manager to enter any ingredient amounts? Does it force use of one unit of measure (i.e., 6.5 lb instead of 6 lb 8 oz)?
- If fractions are used in recipes, does the program allow entering and printing of ingredient amounts in fractions, or does it print them only in decimals? If decimals are used, do staff members understand decimal amounts? Can they convert decimals to measurable amounts?
- How easy is the program to learn?
- What resources are available to help foodservice personnel learn the program?
- How much time is required to enter recipes into the system?
- Will the software allow the recipe to be calculated in “batches” or several smaller quantities?
- Can the program be interfaced with vendor software for purchasing and recipe costing?