

***Guidelines for Including USDA Production Recipes in the Software Programs
Approved by USDA for NSMP and SMI***

April 24, 2007

(Web site URL's and Appendix C updated January 29, 2010)

Want to include the USDA production recipes in your USDA-approved software program? Trying to add USDA production recipes to a school's software program? Need to give users information about how to edit USDA production recipes to their own school's version of the recipe? The purpose of this document is to assist software developers and other users with **voluntarily** adding the USDA production recipes to software programs approved for use in implementing Nutrient Standard Menu Planning (NSMP) and in conducting nutrient analyses that meet School Meals Initiative (SMI) requirements in the National School Lunch and Breakfast Programs.

I. USDA Production Recipes

For many years USDA has provided production recipes for the schools that participate in the National School Lunch and School Breakfast Programs. The most recent set, *USDA Recipes for Schools* was made available in 2005. This set of quantity recipes is the result of a recipe restandardization project in which the recipes from the 1988 *Quantity Recipes for School Food Service* and the 1995 *Tool Kit for Healthy School Meals* were tested, evaluated, revised, standardized, edited, where needed, and consolidated. These updated recipes reflect changes made in the newest edition of the *Food Buying Guide for Child Nutrition Programs*. The recipe ingredients were also updated to include healthier alternatives, such as lower fat ingredients, wherever possible. Revised recipes were also updated with Critical Control Point (CCP) information from the 2003 FDA Food Code supplement.

These updated *USDA Recipes for Schools* are found as pdf files on the Team Nutrition web site at http://teammnutrition.usda.gov/Resources/usda_recipes.html and the National Food Service Management Institute (NFSMI) web site at <http://www.nfsmi.org/ResourceOverview.aspx?ID=115>
Adobe Acrobat Reader is required to view, print, and save the recipes.

After the initial release of the recipes, as changes to recipes were identified, a list of recipes with significant edits was developed. Refer to the web sites at the links provided above for a list of the corrected recipes. The recipes listed were corrected in the pdf files available at the web sites.

Many of the recipes provided by USDA in the past are out-of-date and should no longer be used. As of 6/30/2006, the following recipes should no longer be used for meeting school meal requirements for Federal reimbursement: 1988 *Quantity Recipes for School Food Service*; 1995 *Tool Kit for Healthy School Meals*; Recipes containing Hazard Analysis Critical Control Points based on the 1999 FDA Food Code (provided on CD from the NFSMI); *Chef Challenge* recipes; or any other USDA recipes published prior to the revised (April 2005) school meal recipes. These recipes were not updated using the

new yields in the *Food Buying Guide for Child Nutrition Programs*, were not analyzed using the Yield Factor Method, and are no longer in the CN Database as food items with nutrient analyses. Schools have been instructed not to use these recipes. It is strongly recommended that the software developers remove these recipes from the approved programs. If a developer needs to keep out-of-date recipes, they must be stripped of their USDA recipe number and tagged as local (developer- or user-added). These recipes must be re-analyzed using the Yield Factor Method and updated information from the *Food Buying Guide for Child Nutrition Programs*. The user is responsible for crediting and nutrient analyses for any of these out-of-date recipes that remain in the software program.

II. USDA Production Recipes in the Approved Software Programs

USDA's Child Nutrition (CN) Database includes the nutrient analysis of recipes published in the *USDA Recipes for Schools*. The CN Database only includes the nutrient analyses and units of measure for the standard serving sizes as stated in the recipes. The production recipes with raw ingredients are not included in the CN Database. **Software developers are required to include the CN Database, which includes the recipe nutrient analyses, in the software programs approved by USDA for use with NSMP and SMI.**

The CN Database is found on the Healthy Meals Resource System web site at: <http://healthymeals.nal.usda.gov/cndatabase.html>. The recipe names are included as food items in the FDES file with corresponding units of measure in the WEIGHTS file and nutrients per 100 grams, as analyzed by USDA's Food and Nutrition Service (FNS), in the NUTVAL file.

When the recipes were analyzed to determine the nutrient analyses to include in the CN Database, the Yield Factor Method was used to provide a nutrient analysis that accounts for changes in nutrients caused by preparation and cooking. The Yield Factor Method requires that each raw recipe ingredient be converted and entered in the recipe as a "as consumed" or ready-to-serve (often cooked) ingredient.

The Yield Factor Method of entering recipes will be discussed in detail later in this document or you can obtain more information from the publication *Nutrient Analysis Protocols: How to Analyze Menus for USDA's School Meals Programs* at: <http://teammnutrition.usda.gov/Resources/nutrientanalysis.html>.

Production recipes include raw ingredients and amounts in the uncooked state, directions for producing the recipe, and the yield and serving size as prepared. These recipes are generally used by cooks to prepare the recipe or to calculate how much to order of raw ingredients.

Since many of the approved software programs also provide production, inventory and purchasing modules, several software developers have asked about including the *USDA Recipes for Schools* as production recipes in the software. Since many schools use the

USDA Recipes for Schools, it is convenient to have the production recipes entered for the food service staff to produce a menu item, adjust quantities, print production recipes, and track inventory.

However, the nutrient analysis of production recipes may not calculate an accurate nutrient analysis of the recipe “as consumed”. Therefore, the production recipes must be linked to the nutrient analysis in the CN database or the recipe ingredients must be modified to provide an accurate nutrient analysis.

While it is mandatory that the CN Database nutrient data for recipes be included in all software programs approved by USDA for use with NSMP and SMI, it is **optional** for the software developers to include the USDA production recipes. However, if the USDA production recipes are added, they must duplicate the information from the *USDA Recipes for Schools* and they will be spot checked during the software evaluations for accuracy of ingredients selected and nutrient analysis calculations.

III. Nutrient Analysis of USDA Production Recipes in the Approved Software Programs

If software developers choose to enter USDA production recipes, they must ensure that the program provides accurate nutrient analyses of the recipes. Some programs may need to instruct the user to enter a second recipe for nutrient analysis purposes. To distinguish recipes added for nutrient analysis purposes from the production recipes, these recipes will be called ***nutrient analysis recipes***.

To obtain an accurate nutrient analysis of the USDA production (and other, user-added production) recipes, the developer has several options.

A. Calculate Only Nutrient Analyses, No Production

If the approved software program is only used for nutrient analysis purposes with no production recipes, developers (and other users) can use the information provided in the CN Database to create nutrient analyses of the USDA production recipes that are used by a school.

In the documentation, users must be instructed to use the corresponding CN Database item for the USDA production recipe. Depending on the software program, the user must be instructed to either use the recipe’s CN Database item as the menu item or, for programs that require the user to create a recipe for each menu item, create a recipe with the CN Database item as the only ingredient.

Users should be reminded in the documentation that the USDA production recipes were analyzed using the first ingredient (if an alternate or choice is given) and the analysis does not include optional ingredients. If the user modifies the USDA production recipe

in any way or uses alternate or optional ingredients, then, for nutrient analysis purposes, the user would need to enter the recipe using the Yield Factor Method.

B. Linking USDA Production Recipes to the CN Database Analysis for the Recipe

If a software developer chooses to enter USDA production recipes into the approved program, USDA strongly recommends that the developer link the USDA production recipes to the nutrient analysis of the corresponding CN Database item for each recipe. This can be done for those production recipes that are prepared exactly as stated on the published recipe. The CN Database data is the result of a Yield Factor Method analysis of the USDA production recipes. Linking the production recipe to the CN Database data eliminates the need to enter a second recipe for nutrient analysis purposes.

For example, for recipe *C-01 Apple Cobbler*, the software program would include the USDA production recipe as shown in recipe *C-01*, but when the nutrient analysis is shown or used in calculation, the nutrient analysis for Child Nutrition Database number (CND#) 50038, *Cobblers; apple; with type 1 shortening* would be used. The nutrient analysis for CND# 50038 would be used for displays of the nutrient analysis for *Apple Cobbler* and calculation of the nutrient analysis of any menus that include this recipe.

C. Including Two Recipes: Production and Nutrient Analysis

Depending on how the software program allows the user to enter ingredients for recipes and how the program links to the CN Database nutrient analysis or additional modules of the software program, the developer (or user) will need to have two recipes, a production recipe (which includes raw ingredients) and a nutrient analysis recipe (which includes “as consumed” weights and ingredients). These recipes could be used separately (and named differently to avoid confusion). They could also be linked by total recipe nutrient analysis or by ingredient depending upon the complexity of the program and the need to link to additional inventory or purchasing modules. In the documentation, users must also be given directions for how to enter user-added production recipes to ensure an accurate nutrient analysis.

The production and nutrient analysis recipes could be linked so that the production recipe could be used for production purposes, but the final nutrient analysis is based on the nutrient analysis recipe. Any changes to the production recipe would require that the developer (or user) also edit the nutrient analysis recipe in order for the analysis to remain accurate.

Software developers can link the raw ingredients in the production recipes to the appropriate “as consumed” CND# (or item number) to facilitate user-entry of a nutrient analysis recipe. Yield information would also need to be provided to adjust for the cooked yield. Considerable expertise in linking the raw to “as consumed” ingredient with the appropriate yield is needed for this process.

The software developers should attempt to use the same ingredients in any developer-added nutrient analysis recipe as used by USDA in the nutrient analysis for the CN Database. USDA has provided *Ingredients Used in Yield Factor Method Analysis of USDA Recipes for Schools*, a spreadsheet listing the food items that were used in calculating the nutrient analysis data for the recipes included in the CN database. This spreadsheet is located at: <http://healthymeals.nal.usda.gov/software/support.html>. If the USDA production recipe is entered using raw ingredients and linked to a nutrient analysis recipe, the developer should check the calculated analysis against the USDA analysis on the printed recipe (or pdf file) or in the CN database. The nutrient values of these two analyses should be very close. This will result in a product that, when prepared, has a nutrient composition close to the values in the nutrient analysis from USDA.

Additional yield-adjusted units of measure from the *Food Buying Guide for Child Nutrition Programs* may be added by the developer (or user). The information from this publication was modified and included in the CN Database as the FOOD BUYING GUIDE (BUYGD) and FOOD BUYING GUIDE LINK (BYGDLNK) files. In these files, information from the *Food Buying Guide for Child Nutrition Programs* is linked to applicable items in the CN Database. Software developers are required to include this information as a reference to the user at the ingredient or item level. It is also strongly recommended that this information be available to the user when adding ingredients to recipes. A list of Pen and Ink Changes for the printed *Food Buying Guide for Child Nutrition Programs* is also available.

Care should be taken when adding the additional Food Buying Guide data to the “as consumed” product code to be sure that the adjusted yield is calculated on the “as consumed” product. Whenever yields change due to updates in the *Food Buying Guide for Child Nutrition Programs*, developer-created yield data will also need to be updated. It must be clear that user- or developer-added units of measures from the Food Buying Guide information are not from the CN Database WEIGHTS file.

Yield-adjusted units of measure are available for some ingredients in the CN Database. However, caution must be used with yield-adjusted measures from the CN Database. Many are from the USDA Database for Standard Reference and are not applicable to school foodservice. For example, for many raw chicken items in the CN Database there is a “unit (yield from 1 lb ready-to-cook)” unit of measure. This is often misinterpreted as meaning that this is the cooked yield from 1 lb “ready-to-cook” chicken, when, in fact, it is the *raw* yield of that particular part of the chicken (such as wing or thigh) from one pound of raw, ready-to-cook, whole chicken. In some cases, the raw to cooked yields in the CN database, may not match the yields in the *Food Buying Guide for Child Nutrition Programs*.

Since many recipes include partially prepared ingredients, for example, onions, chopped, a chart of raw-to-cooked conversion factors for selected vegetables from a partially prepared state is included in this publication in Appendix A. This chart originally appears as Appendix G in the *Nutrient Analysis Protocols: How to Analyze Menus for USDA’s School Meals Programs*.

The accuracy of the nutrient analysis is paramount and will be checked by the software evaluation coordinator during the software evaluation. There may be some small differences in the final nutrient analyses due to changes in the CN Database since CN8, the version used to analyze most of the recipes for the CN Database.

IV. Additional Requirements for Entering Nutrient Analysis Recipes

Users who enter their own production recipes should follow the same guidelines as required or recommended for the software developers.

A. Using First Ingredient of a Choice of Ingredients

The USDA production recipes that are linked to the CN Database analyses should be entered using the first ingredient if a choice (or alternate ingredient) is listed. For many ingredients in the USDA production recipes, the user is given a choice of two ingredients, such as “fresh onions or dehydrated onions”. Use the first ingredient, whenever the USDA nutrient analysis is used.

For example, for USDA Recipe *D-45B, Taco Pie with Beans*, the choice is “canned pinto beans, drained” or “dry pinto beans, cooked”. Because “canned pinto beans, drained” is listed first, this is the ingredient used by USDA to calculate the nutrient analysis for the CN Database. Another recipe with an example of using a choice of ingredients is *E-24 Hummus*. In this recipe, the user is instructed to use “peanut butter or tahini or sunflower seed butter”. Because peanut butter is listed first, this is the ingredient used in the nutrient analysis in the CN Database.

If the second (or third) of a choice is actually used by the school, such as the tahini or sunflower seed butter listed for *E-24 Hummus* above, then a copy of the recipe should be made and edited to include the second of the choice of ingredients with the analysis calculated by the software program using the Yield Factor Method.

B. Handling Optional Ingredients

When USDA recipes were analyzed, variations, including optional ingredients, were not included in the analyses. If an ingredient is tagged as “optional” in the printed recipe, it should not be included in the production recipe that is linked to the corresponding CN Database item for that recipe.

In addition, some variations are included in the recipe instructions. These include ingredients listed as “optional”, instructions to frost, or other recipe variations listed at the bottom of the printed recipe (or pdf file). For example, *C-01 Apple Cobbler* has two variations listed at the bottom of the recipe: *Apple-Honey Cobbler* and *Apple-Raisin Cobbler*.

In some cases, USDA has provided the nutrient analysis of recipe variations, for example, recipes with and without frosting or recipes with and without the optional ingredient nuts. If a variation is not provided in the CN Database, a copy of the recipe must be made that includes the optional ingredient(s) with the analysis calculated by the software program.

For example, USDA Recipe *C-04 Brownies* lists “chopped walnuts (optional)” on the ingredient list. This ingredient was not included in the nutrient analysis for the CN Database item (CND# 50044). Under step 7, this recipe also says “If desired, lightly dust with powdered sugar.” The powdered sugar is not included in the nutrient analysis for CND# 50044. *C-04a Brownies with Walnuts* is included in the CN Database as CND# 50079. If the walnuts are included, the developer (or user) must link to CND# 50079. If the powdered sugar or another nut, such as pecans, is used in the recipe, the user must create a copy of the recipe, rename the recipe, and add these ingredients.

With some recipes, such as *C-05 Carrot Cake*, the directions say “if desired, frost...”, but the frosting was not included in the nutrient analysis in the CN Database. In most cases, the frosting suggested is also included as a USDA production recipe and can be added to the menu as a separate menu item or to a copy of the recipe as a separate ingredient. A copy of the recipe can be made and the frosting added to the recipe with the nutrient analysis calculated by the program. In some cases, the CN Database includes both a frosted and non-frosted version, such as *C-26 Peanut Butter Bars*. The CN Database includes CND# 50226, *Peanut Butter Bars*, CND# 50227 *Peanut Butter Glaze*, and CND# 50209 *Peanut Butter Bars with Peanut Butter Glaze*. For *C-21 Royal Brownies* the CN Database includes entries for brownies, brownies with walnuts, brownies with brownie icing, and brownie icing.

For many recipes in the Grains/Breads category, directions are included for a variation using *B-01 Master Mix* (on the last page of the recipe). For these recipes, the CN Database includes the nutrient analysis for the original recipe and the variation of the recipe using *B-01 Master Mix*.

C. Copying USDA Production Recipes

The nutrient analysis will be more accurate if the actual ingredients used by the school are used in the recipe and its nutrient analysis. Production recipes linked to the CN Database recipe analysis must be prepared exactly according to the printed recipe (or pdf file) using the first of alternate ingredients and no optional ingredients. If different raw ingredients are used in a production recipe that is linked to the nutrient analysis from the CN Database, the user will need to be instructed to develop and enter a new recipe using the Yield Factor Method. For the nutrient analysis, users should be instructed to copy the production recipe and replace the raw ingredients with “as consumed” ingredients along with corresponding changes to the amounts for the food items that are affected by preparation and cooking. Ideally, the user will receive a warning message on screen stating that raw ingredients must be replaced with “as consumed” ingredients.

The USDA production recipes as entered by the developer must be locked, so the user cannot edit them. The user must be required to make a copy of the USDA production recipe and rename it, before editing the recipe. If the user edits a USDA production recipe, the nutrient analysis will no longer match the nutrient analysis of the recipe as a food item in the CN Database. Also, if the production recipe is edited, the integrity of the recipe is lost and it is no longer the USDA recipe. When copied, the recipe source must be changed to user-added (“local”). The user must be allowed to make copies of the USDA production recipes and make adjustments for specific ingredients used by the schools, such as use of the second choice of ingredient (such as choosing pork when “beef or pork” is listed), an optional ingredient, or a specific brand of ingredient. Allowing the school to enter recipes using the ingredients unique to their school should result in more accurate nutrient analyses.

D. Identifying the Source of USDA Production Recipes

USDA does not provide the USDA production recipes as production recipes in the CN Database or in any other downloadable or electronic format. If a software developer chooses to include the USDA production recipes, the developer must enter the recipes into their software program from the printed copy or pdf file. USDA production recipes entered by the software developer must be tagged as “developer-added” USDA production recipes. The production recipes may still be labeled as the USDA recipes with the USDA recipe names and numbers; however, the source field should indicate that they are developer-added.

The developer may use “developer-added”, a company abbreviation, software name abbreviation, or some other suitable means. The developer may use a code with an explanation in a key or legend. The developer may want to have a separate tag for developer-added and user-added production recipes, however this is not required.

The software developer must list the source of the nutrient analyses from the CN Database as USDA (USDA, CNDB, or Standardized Recipe Calculation [the description of the CN Database source code for the standardized recipes]). If other sources of nutrient data from USDA, such as the Database for Standard Reference, are included in the software program’s database, the developer must make it clear which data is from the CN Database. When production recipes are copied by the user, the recipe source must be changed to user-added (“local”).

E. Updating to Current USDA Production Recipes

The software developer will need to periodically update the USDA production recipes when changes are made to the recipes at the Team Nutrition and NSFMI web sites, or when ingredients are no longer available in the CN Database. Any USDA recipes that are updated on the web sites will be updated in the CN Database in the next Release. Check with the Software Evaluation Coordinator if you are not sure which version of the recipe was used in the nutrient analysis for the CN Database. USDA can also provide guidance with selecting items to replace discontinued and removed CN Database items.

V. *Yield Factor Method*

A. *Overview of the Yield Factor Method*

State agency and school food service personnel have been provided training in using the Yield Factor Method. Non-USDA or user-added (local) recipes must also be entered using the Yield Factor Method of analysis, not as production recipes, for nutrient analysis purposes.

The Yield Factor Method requires that each raw recipe ingredient be converted and entered in the recipe database as a “as consumed” or ready-to-serve (often cooked) ingredient. Production recipes list raw ingredients. When recipes are prepared, the nutrients in the food that is actually consumed are often very different from the nutrients in the raw ingredients. Ingredients listed in the production recipe are usually listed as “as purchased” or partially prepared (chopped, diced) amounts, and may include skin, bone, peel, and other portions of the food that are not typically eaten.

The nutrient analysis should reflect the “as consumed” or edible portion. Cooked ingredients have different nutrient values than raw ingredients. Cooking can affect the nutrient analysis by changing the volume, changing fat or moisture in the food, or changing nutrient values. The nutrient analysis of the ready-to-serve or cooked recipe should be used because this is what will actually be consumed.

To ensure the correct nutrient analysis of the recipe, it is important to select the correct ingredients from the program’s database. For ingredients that change considerably during preparation or cooking, an “as consumed” ingredient should be used for the recipe for nutrient analysis rather than the raw ingredient listed in the production recipe. Vegetables, meats, pasta, and rice are all examples of foods that change considerably during preparation and cooking. The ingredient amount must also be converted to the “as consumed” amount.

B. *Example of Using the Yield Factor Method*

Below is an example of how to enter a recipe using the Yield Factor Method. Recipe *D-35A Spaghetti and Meat Sauce (Ground Beef and Ground Pork)* includes raw beef and pork, fresh onions, and dry spaghetti. All of these ingredients change significantly during preparation and this will affect the nutrient analysis.

See the Appendix B for a copy of the production recipe *Spaghetti and Meat Sauce (Ground Beef and Ground Pork)*.

In this example, the ingredient amounts for 50 servings are used.

Ingredient #1 - Ground Beef

1. The recipe calls for 5 lb 8 oz. raw ground beef (no more than 20% fat). To use the Yield Factor Method, the user must select a cooked version of ground beef with no more than 20% fat and calculate the yield of cooked meat from the raw amount.
2. Select CND# 23575 *Beef, Ground, 80% Lean Meat/20% Fat, Crumbles Cooked* from the Ingredient database.
3. Then refer to the Food Buying Guide information to obtain a factor to convert the raw ingredient amount to a cooked ingredient amount. You can refer to the Food Buying Guide as presented as a reference in a USDA-approved software program or refer to the printed manual, *Food Buying Guide for Child Nutrition Programs*.
4. On page I-16 of the *Food Buying Guide for Child Nutrition Programs*, you find that 1 lb. AP (as purchased) Beef, ground, fresh or frozen no more than 20% fat yields 0.74 pounds cooked, drained, lean meat.
5. For this recipe, take 5 lb. 8 oz raw ground beef and convert to 88 total ounces (5 lb X 16 oz per lb = 80 oz plus 8 oz equals 88 oz). Multiply $88 \times .74 = 65.12$ oz cooked ground beef. This equals 4 lb (64 oz) plus 1.12 oz.
6. Enter 65.12 oz or 4 lb 1.12 oz or 4.07 lb of CND# 23575 *Beef, ground, 80% lean meat, 20% fat, crumbles, cooked* into the nutrient analysis recipe.

Ingredient #2 – Ground Pork

1. The recipe calls for 3 lb of raw ground pork (no more than 20% fat)
2. Select CND# 10803 *USDA Commodity, Pork, Ground, Fine/Coarse, Frozen, Cooked*.
3. If you look up the Food Buying Guide information for this item in a USDA-approved software program, you will find that for CND# 10803, 1 pound AP yields 0.74 pounds cooked lean meat.
4. Convert 3 lb raw pork to ounces (3 lb X 16 oz per lb = 48 oz). Multiply $48 \times .74 = 35.52$ oz. cooked ground pork. This equals 2 lb plus 3.52 oz.
5. Enter 35.52 oz or 2 lb 3.5 oz or 2.22 lb of CND# 10803 *USDA Commodity, Pork, ground, fine/coarse, frozen, cooked* into the nutrient analysis recipe.

Ingredient #3 – Fresh Onions

1. This recipe also calls for 8 oz of fresh onions, chopped.
2. Select the cooked equivalent of this item from the program's database. In this example, CND #11283 *Onions, cooked, boiled, drained, without salt* is used.
3. Refer to Appendix A for a chart of raw-to-cooked conversion factors for selected vegetables from a partially prepared state. The yield factor for onions, peeled, cut is .88.
4. Multiply 8 oz X .88 = 7.04 oz.
5. Enter 7.04 oz of CND# 11283 *Onions, cooked, boiled, drained without salt* into the nutrient analysis recipe. .

Ingredient #4 – Enriched Spaghetti

1. This recipe also calls for enriched spaghetti, 4 lb 12 oz
2. Select CND#20321 *Spaghetti, cooked, enriched with salt* from the ingredient database.
2. If you refer to the *Food Buying Guide for Child Nutrition Programs*, on page 3-28, you will find that for Pasta, Spaghetti, Regular, Dry 1 lb dry = 2.37 pounds (about 5-1/4 cups) al dente cooked pasta (boiled 8 minutes).
3. To find the cooked amount to use for the nutrient analysis, convert 4 lb 12 oz to 76 oz (4 lb X 16 oz per lb = 64 oz + 12 oz = 76 oz.).
4. Multiply 76 oz X 2.37 = 180.12 oz or 11 lb 4 oz.
5. Enter 180.12 oz or 11 lb 4 oz or 11.26 lb of CND# 20321 *Spaghetti, cooked, enriched with salt* into the nutrient analysis recipe.

For this recipe, because the water and salt absorbed by the pasta is included in the cooked spaghetti ingredient, the actual ingredients of **water and salt should not be included** in the nutrient analysis recipe. Including the additional water and salt would increase the gram weight of the final product, as well as inflate the sodium content of the final recipe as consumed.

Remember that to use the Yield Factor Method correctly, you must use both the “as consumed” ingredient AND the yield-adjusted amount. Since the other ingredients in this recipe (tomato puree, garlic, spices) are not significantly affected by preparation, those ingredients may be entered as they appear on the production recipe.

VI. *Tips and Suggestions for Selecting Ingredients*

It can be challenging to select the correct ingredients when entering the USDA production recipes as nutrient analysis recipes. The points to consider and examples of errors below are included because these are issues that have been found in the USDA recipes when included in the software programs approved by USDA.

USDA has developed a publication, *Ingredients Used in Yield Factor Method Analysis of USDA Recipes for Schools*, that lists the CND# for each ingredient that was used by USDA in the analyses of the USDA recipes using the Yield Factor Method. For entering corresponding raw ingredients for production recipes to the “as consumed” ingredient used in the nutrient analysis recipe, match the description as closely as possible to an uncooked version of the food item from the CN Database or, if unavailable in the CN Database, Database for Standard Reference (See list of *Helpful Resources* at the end of this publication.). Schools should enter into the software the actual ingredients they use, whenever possible, for example, whole grain pasta, lower fat meats, and so forth. School-modified or developed recipes with different ingredients need to be standardized to the school’s production. Also, yields must be verified.

As discussed above in the Yield Factor Method section, many ingredients change greatly when prepared, such as meat, vegetables, pasta, and rice. However, some foods have little change in nutrition or weight during cooking. You must use caution when entering recipe ingredients because entering the wrong ingredient can result in incorrect nutrient analyses, as well, as incorrect amounts for production.

Remember that to use the Yield Factor Method correctly, you must use both the “as consumed” ingredient AND the yield-adjusted amount.

Common errors when entering recipe ingredients include:

1. **Using a raw ingredient for a cooked ingredient, such as dry pasta instead of cooked pasta for nutrient analysis.** Often when entering recipes, the ingredient is entered as shown on the production recipe. This is fine for production, but, in many cases, the nutrient analysis will be incorrect. As discussed in the Yield Factor Method section, the nutrients in many ingredients, such as meats, vegetables, pasta, and rice, change significantly during preparation. The recipe used for the nutrient analysis needs to include the “as consumed” version of these ingredients. Preparation affects both the nutrient content and amount of the ingredient.
2. **Using an “as consumed” ingredient with the raw amount or a raw ingredient with an “as consumed” amount.** Be sure to use the correct amount and unit of measure for ingredients. Double check the nutrient analysis recipe to be sure ingredients replaced with “as consumed” ingredients also have the ingredient amount adjusted. Using either a cooked ingredient with the raw amount or a raw

3. **Using the ingredient amount for the dry amount for a reconstituted item, such as non fat dry milk or soup base.** (i.e. using 2 cups of powder instead of 2 cups of liquid, reconstituted ingredient) Many of the recipes call for a reconstituted ingredient. A reconstituted ingredient is one that starts as a dry ingredient, but is reconstituted with water for the recipe ingredient. Many soup bases and non-fat dry milks are listed in the USDA production recipes as the dry reconstituted ingredient, such as “nonfat dry milk, reconstituted”. For example, *C-15 Rice Pudding* calls for 3 quarts instant nonfat dry milk, reconstituted. Sometimes the recipe amount is given as the dry powder instead of the reconstituted liquid. If an item is listed as “reconstituted”, this means that the liquid milk with water added, not the powder, should be used in the nutrient analysis. You can imagine the results, in the Rice Pudding example, if 3 quarts of nonfat dry milk were used in the nutrient analysis. This is the equivalent of over 9 quarts of reconstituted, liquid milk.
4. **Misinterpretation of units of measure.**

The *USDA Recipes for Schools* list both weights and volumes for most ingredients. **Weight** should always be used as the unit of measure, if it is provided. Only use volume measurements if a weight measure is not provided or for liquid measures.

A can (such as a #10 can) or scoop size (such as #8 scoop) should not be used as a measuring device. The can measure in the USDA production recipes is provided only as an estimate of amount so that the cook may estimate how many cans to take from the storeroom. Software developers and other users are discouraged from adding local measures for cans and scoop sizes.

Fluid ounce, liter, and milliliter are traditionally used for liquid ingredients. Often fluid ounce and weight ounce are confused. If fluid ounce is selected for ounce, errors in the nutrient analyses may result. For this reason, software developers must no longer automatically convert volume measures to fluid ounce, liter, and milliliter. These three measures should only be present if one of these measures is included in the Weights file of the CN Database or added by the user.

For some ingredients the amount is listed as a drained amount and the liquid is either discarded or reserved. Whenever possible, use a drained product when the recipe calls for a drained item, such as “pinto beans, drained”. In some cases additional water is added to the reserved liquid before adding it to a recipe. In the recipes, *C-01 Apple Cobbler* and *C-13 Peach Cobbler*, the ingredient list calls for all of the reserved liquid from the canned fruit plus cold water as needed to equal an amount, such as 2 quarts in the Apple Cobbler recipe. When USDA analyzed these recipes both the fruit and liquid were used in the analyses. For example, for

C-01 Apple Cobbler, the weight of fruit and juice was used in the nutrient analysis—13 lb for 50 servings. Additional water totaling the total amount of liquid needed (juice plus water to equal 2 quarts) was added to the recipe. The extra water will not affect the nutrient analysis, but will affect the gram weight of the recipe.

When converting to yield-adjusted measures, it is best to enter unrounded values or round up to be sure that the actual amount served meets the stated “crediting” amounts on the serving statement of the recipe. Since meat, vegetables, fruit, breads, and so forth all need a certain amount to “credit” for the meal pattern, always round up on the amounts of ingredients to be sure that the “crediting” is not less than what is stated on the recipe. If you round down, the amount of food could actually be a little less and provide less than the stated crediting amount.

VI. *Moisture and Fat Changes in Recipes*

The amount of moisture (water) and fat frequently change due to cooking. Using the Yield Factor Method of recipe analysis will account for changes in moisture and fat in a recipe due to cooking since the “as consumed” ingredients are used. In most cases, additional moisture or fat change calculations will not be necessary.

However, there are commercially prepared products (chicken nuggets, fritters) that may not be in the CN Database as a deep-fried version. If a commercially prepared product will be deep fried, and it is not in the CN Database, a recipe will need to be created that can be adjusted for moisture losses and fat gains which occur with frying. However, if the Nutrition Facts Label or if the manufacturer has provided “as served” data using the method of cooking and/or other preparation that will be used in the school kitchen, the food item nutrient values as prepared can be entered directly into the ingredient database.

Software developers are required to allow the user to enter both a moisture gain or loss percentage and a fat gain or loss percentage, where applicable, along with the type of fat for these commercial products. The type of fat is the type of fat changed during cooking, such as the type of oil for frying. The nutrient analysis and weight of the recipe serving are calculated using these moisture or fat change percentages.

Moisture and fat change percentages are not provided for the USDA production recipes. Some known moisture and fat changes are listed in *Nutrient Analysis Protocols: How to Analyze Menus for USDA’s School Meals Programs* in Appendix H.

Software developers should refer to *Algorithms for Calculation of Moisture and Fat Changes in Recipes*, in the resources listed below, for instructions about how to calculate moisture and fat changes in recipes.

VII. Helpful Resources

- a. *Algorithms for Calculation of Moisture and Fat Changes in Recipes*. (part of packet of guidance documents for software developers, May 17, 1995; Word version available upon request from the Software Evaluation Coordinator)
- b. *Approved Software Programs* [software programs approved by USDA for use with implementing NSMP and SMI initiatives]
<http://healthymeals.nal.usda.gov/software.html>
- c. *Child Nutrition Database*
<http://healthymeals.nal.usda.gov/cndatabase.html>
- d. *Food Buying Guide for Child Nutrition Programs* [March 2002]
<http://teamn nutrition.usda.gov/Resources/foodbuyingguide.html>
(Pen and ink updates to this publication are also available at this web site.)
- e. *Ingredients Used in Yield Factor Method Analysis of USDA Recipes for Schools* (sent with this publication, available upon request from the Software Evaluation Coordinator, or available at:
<http://healthymeals.nal.usda.gov/software support.html>)
- f. *Nutrient Analysis Protocols: How to Analyze Menus for USDA's School Meals Programs*
<http://teamn nutrition.usda.gov/Resources/nutrientanalysis.html>
- g. *USDA National Nutrient Database for Standard Reference (SR)*
http://www.ars.usda.gov/Main/site_main.htm?modecode=12-35-45-00
- h. *USDA Recipes for Schools*:
http://teamn nutrition.usda.gov/Resources/usda_recipes.html or
<http://www.nfsmi.org/ResourceOverview.aspx?ID=115>

VIII. Appendices

Appendix A –Raw-to-Cooked Conversion Factor for Selected Vegetables [from Appendix G of *Nutrient Analysis Protocols: How to Analyze Menus for USDA's School Meals Programs*:

<http://teamn nutrition.usda.gov/Resources/nutrientanalysis.html>]

Appendix B – D-35A Spaghetti and Meat Sauce (Ground Beef and Ground Pork) [from the *USDA Recipes for Schools*:

<http://www.nfsmi.org/ResourceOverview.aspx?ID=115>

Appendix C - Tips for Using MS Excel file titled, “Ingredients Used in Yield Factor Method Analysis of USDA Recipes for Schools”

APPENDIX G
Raw-To-Cooked Conversion Factor for Selected Vegetables

| Food Item (Raw, Ready-To-Cook) | Yield (cooked) |
|---|---------------------------|
| Apples, cored, cut or whole | .85 |
| Asparagus, trimmed | .94 |
| Beets, pared | .94 |
| Cabbage, Green, cored | .94 |
| Carrots, sliced | .91 |
| Cauliflower, stemmed | .98 |
| Celery, trimmed | .89 |
| Chayote (Mirliton), pitted, sliced | .91 |
| Jicama (Yam Bean), peeled, julienned | .97 |
| Malanga (Taro), peeled, diced | 1.20 |
| Onions, peeled, cut | .88 |
| Pepper, Bell, stemmed, seeded, cut | .91 |
| Potato, pared | .91 |
| Squash, Yellow, trimmed, sliced | .87 |
| Tomatillo, stemmed, diced | .83 |
| Turnips, pared, cubed | .93 |
| Yautia (Tannier), peeled, diced | 1.00 |
| Zucchini, trimmed, cubed | .90 |

Appendix B

Spaghetti and Meat Sauce (Ground Beef and Ground Pork)

Meat/Meat Alternate-Vegetable-Grains/Breads

Main Dishes

D-35A

| Ingredients | 50 Servings | | 100 Servings | | Directions |
|---|----------------------|------------------------------|--------------------|----------------------------------|--|
| | Weight | Measure | Weight | Measure | |
| Raw ground beef (no more than 20% fat) | 5 lb 8 oz | | 11 lb | | 1. Brown ground beef and ground pork. Drain. Continue immediately. Add onions. Cook for 5 minutes. |
| Raw ground pork (no more than 20% fat) | 3 lb | | 6 lb | | |
| *Fresh onions, chopped OR Dehydrated onions | 8 oz OR 1 ½ oz | 1 ½ cups OR ¾ cup | 1 lb OR 3 oz | 2 ¾ cups OR 1 ½ cups | 2. Add granulated garlic, pepper, tomato puree, water, parsley, basil, oregano, marjoram, thyme, and salt. Simmer about 1 hour. CCP: Heat to 155° F or higher for at least 15 seconds. |
| Granulated garlic | | 1 Tbsp 1 ½ tsp | | 3 Tbsp | |
| Ground black or white pepper | | 1 ½ tsp | | 1 Tbsp | |
| Canned tomato puree | 5 lb | 2 qt ½ cup (¾ No. 10 can) | 10 lb | 1 gal 1 cup (1 ½ No. 10 cans) | |
| Water | | 2 cups | | 1 qt | |
| Dried parsley | | ¼ cup | | ½ cup | |
| Dried basil | | 2 Tbsp | | ¼ cup | |
| Dried oregano | | 2 Tbsp | | ¼ cup | |
| Dried marjoram | | 1 Tbsp | | 2 Tbsp | |
| Dried thyme | | 1 ½ tsp | | 1 Tbsp | |
| Salt | | 1 Tbsp | | 2 Tbsp | |
| Water | | 6 gal | | 12 gal | 3. Heat water to rolling boil. Add salt. |
| Salt | | 2 Tbsp | | ¼ cup | |
| Enriched spaghetti, broken into thirds | 4 lb 12 oz | 3 qt 3 ½ cups | 9 lb 8 oz | 1 gal 3 ¾ qt | 4. Slowly add spaghetti. Stir constantly, until water boils again. Cook 10-12 minutes or until tender; stir occasionally. DO NOT OVERCOOK. Drain well. Run cold water over spaghetti to cool slightly. |
| | | | | | |
| | | | | | 5. Stir into meat sauce. |
| | | | | | 6. Divide equally into medium half-steamtable pans (10" x 12" x 4") which have been lightly coated with pan release spray. For 50 servings, use 3 pans. For 100 servings, use 6 pans. |

Spaghetti and Meat Sauce (Ground Beef and Ground Pork)

Meat/Meat Alternate-Vegetable-Grains/Breads

Main Dishes

D-35A

7. CCP: Hold for hot service at 135° F or higher.

Portion with 8 oz ladle (1 cup) per serving.

Comments:
*See Marketing Guide.

Marketing Guide for Selected Items

| Food as Purchased for | 50 Servings | 100 Servings |
|-----------------------|-------------|--------------|
| Mature onions | 10 oz | 1 lb 4 oz |

| SERVING: | YIELD: | VOLUME: |
|--|---|--|
| 1 cup (8 oz ladle) provides 2 oz equivalent meat/meat alternate, 3/4 cup of vegetable, and 1 serving of grains/breads. | 50 Servings: about 3 medium half-steamtable pans 100 Servings: about 6 medium half-steamtable pans | 50 Servings: about 3 gallons 2 cups 100 Servings: about 6 gallons 1 quart |

Edited 2006

| Nutrients Per Serving | | | | | |
|-----------------------|---------|----------------------|--------|----------------------|---------|
| Calories | 320 | Saturated Fat | 3.99 g | Iron | 3.70 mg |
| Protein | 20.53 g | Cholesterol | 54 mg | Calcium | 38 mg |
| Carbohydrate | 34.24 g | Vitamin A | 640 IU | Sodium | 307 mg |
| Total Fat | 10.88 g | Vitamin C | 5.8 mg | Dietary Fiber | 2.9 g |

Appendix C

Tips on using Ingredients used in Yield Factor Method Analysis of *USDA Recipes for Schools* Excel file (Excel file updated October 16, 2007; Tips updated April 3, 2008 & January 29, 2010)

The Excel file lists the ingredients and the amounts used in the analysis of the *USDA Recipes for Schools* using the Yield Factor method. This file can be used by software developers or software users to enter the recipes by ingredient and obtain a nutrient analysis close to the nutrient data on the printed recipes. There may be small differences in the results because the original analysis was completed using the CN8 version of the Child Nutrition database, but the current version is CN14. Since there could be small difference in the nutrient updates of the database, this would be reflected in an analysis completed using a later version of the CN database. Please compare the nutrient analysis produced by your software using this data to the nutrient data associated with the CN code for the recipe for accuracy.

Below are some tips or practices that may explain some of the conventions used in the analysis of the recipes:

- Minor changes were made to text in January 2010, mostly updates to URL's and email addresses
- Changes made to this tips section in April 2008 are shaded in blue.
- Changes to the recipes made in the October 2007 update to this spreadsheet are shaded in yellow. The entire recipe name, number, and CND# along with the ingredient, CND# of the ingredient, and amount are highlighted.
- Changes to the recipes made in this spreadsheet updates through August 2007 are shaded in rose. The entire recipe name, number, and CND# along with the ingredient, CND# of the ingredient, and amount are highlighted.
- For many recipes there is no difference between the production recipe amounts and the Yield Factor recipe amounts, particularly for recipes where there is no cooking involved or no change in yield due to cooking.
- Remember that the cooked codes or the "as consumed" codes and the yield calculated from the Food Buying Guide were used to calculate the Yield Factor recipe.
- In general, decimal amounts were used in the calculations. Since these analyses would not be used by cooks, it is not necessary to include fractional equivalents. Weights, if available, were used for most ingredients in the calculations rather than volumes.
- The CN numbers for the associated Yield Factor recipes are provided for information purposes. However, developer or user-added Yield Factor recipes should be identified as developer or user-added in the software.
- Yield Factor recipes are provided for some of the variations or alternate ingredients listed on the recipe cards, even though the nutrient values are not provided on the printed recipe cards for these options. This data is associated with existing CN ingredient numbers for these variations.

- For items that contained a marinade that was not included in the final served product, e.g. Honey-Baked Chicken (D-44), Chicken Fajitas (D-40), small percentage of the ingredients was calculated as the amount that would cling to the final product.
- For taco, tortilla, and bread products, the production recipe states the weight that is needed in order for the product to credit as a bread equivalent (0.9g or 1.8g). If there was a comparable or close product in the CN database to this gram weight, the food item (one slice, one taco, one tortilla) was used in the analysis. If there was not a comparable item, then the weight specified for the number of servings was used in the analysis (45g or 90g for 50 servings). Schools should replace the weight with the actual product used in the school to make the recipe since most commercial products will not match the gram weight in the CN database exactly.
- The beef (CN#118345) and chicken soup (CN#118344) bases used in testing and evaluating the recipes was a low sodium, low fat product that has been added to CN11. In the recipes, water and the weight of the soup base used in the analysis are given. In reality, a recipe could be created for the reconstituted soup base. If a different soup base is used by schools, the data from the soup base actually used should be added to the software.
- Four ingredients are in the recipes that are not currently in the Child Nutrition database, but will be added by CN12. The nutrient data for these items will need to be added to your software to include them in the recipes. Cheese, blend of American and Skim milk cheeses (Ingredient #900001) and Potato, dehydrated slices (Ingredient #725) are Commodity Food products added to the program's database using data from the Food Distribution web site at: <http://www.fns.usda.gov/fdd/schfacts/>. Mayonnaise, reduced-calorie or diet, cholesterol-free (Ingredient #42138) is used in some of the alternate recipes that contain mayonnaise that are not in the printed edition of the *USDA Recipes for Schools*. For Bean Soup (H-01) and Bean Soup with diced ham (H-01A), ingredient #16338 Beans, navy, mature, seeds, ckd, bld, w/salt must be added to the program's ingredient database. Both the mayonnaise and navy beans can be obtained from the ARS Database for Standard Reference at <http://www.nal.usda.gov/fnic/foodcomp/search/index.html>
- For ingredients added from the ARS Database for Standard Reference or Food Distribution web site (commodity foods), the ingredient numbers must be changed following the requirements for approved software programs, so that they are out of the range of numbers used by the CN Database, preferably 900,000-999,999.
- Please note that the Commodity Fact sheets are in the process of revision with updated nutrient information to be available soon. When available, the updated product information will be added to the CN database. Since many commodity products were used in the *USDA Recipes for Schools*, developer or user-added recipes should be updated with the current products when this information is available. (Note: Updated commodity information added to CN14.)
- Some recipes specify using a recipe within a recipe, e.g. Cooking Rice (B-03) is used as an ingredient in a number of other recipes containing rice. Master Mix (B-01) is used as a variation in many of the baked bread products.
- For some recipes, e.g. Apple Cobbler, the recipe specifies that water be added to the juice from the canned apples to provide a specific amount. Since there is

variation in the amount of liquid that is drained from canned fruits, both the weight of the undrained fruit and the total amount of water required are included in the analysis. Since water provides few nutrients, the nutrient values per serving should not be affected. However, the gram weight of the product will be higher than the actual weight of the final product.

- For Refried Beans (I-15) the *optional* seasonings (chili powder, ground cumin, paprika, and onion powder) were inadvertently included in the nutrient analysis on the printed (pdf file) recipe. They have been removed (7/27/2007) from the Excel spreadsheet. These ingredients may be left in the recipe, if desired. Including (or excluding) these seasoning ingredients will make little difference in the nutrient analysis.
- We cannot guarantee that there were no data entry errors made in creating this file. Please contact Natalie Partridge (natalie.partridge@ars.usda.gov) if there are serious discrepancies.

Several developers have asked if we will be updating the spreadsheet that accompanies the recipe guidance document with each update of the CN Database. This spreadsheet will not be updated. Although some of the food items listed on the spreadsheet may be deleted or modified with the CN Database updates, similar items should be available for most basic food items. The purpose of the spreadsheet was to provide the developers with the foods that were used to analyze the USDA recipes for the CN Database and to match the nutrient analysis of the production recipes at

http://www.fns.usda.gov/tn/Resources/usda_recipes.html or
<http://www.nfsmi.org/ResourceOverview.aspx?ID=115>

The spreadsheet also serves as a guide to the types of foods that must be entered to show “as consumed” nutrient values using the Yield Factor Method of Analysis.

For developers who link the USDA recipe to the analysis of the corresponding recipe in the CN Database, the foods provided in the spreadsheet resulted in the same nutrient analysis as found in the CN Database at the time of the original publication. There may be some differences due to changes to data in the CN Database over time. Entry of recipes into the software and use of these food items is optional. Similar food items can be used, but the developer must try to select items that results in the same nutrient analysis as in the CN Database (plus or minus 5%).

For developers who do not link to the corresponding item in the CN Database, these items are shown to assist the developer with selection of “as consumed” ingredients for the nutrient analysis. If an item on the spreadsheet is no longer in the CN Database, the developer should replace it with a similar item either from the CN Database, Database for Standard Reference, or food label of a locally used item. Please refer to the recipe guidance document found at: <http://healthymeals.nal.usda.gov/software/support.html> for more information about entering recipes using the Yield Factor Method.