

Evaluation of Typical Portion sizes of Fruit Cake as reported in National
Food Consumption Surveys

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I. INTRODUCTION

Exponent, Inc. evaluated the available data to determine the most appropriate serving size (reference amount) for multi-serving fruit cakes. Exponent considered the characteristics of fruitcake and reviewed the information that FDA used to define the categories and reference amounts in its promulgation of reference amounts to determine the most appropriate category and reference amount for fruit cake. This analysis included a review of FDA procedures, USDA food consumption and nutrient data that are currently available including those in the US Department of Agriculture's National Nutrient Database for Standard Reference regarding serving sizes for fruit cakes.

According to the CFR (21 CFR 101.12), FDA did not rely on a single procedure for estimating the serving size for all foods, but rather employed a series of general principles and factors to estimate reference amounts customarily consumed per eating occasion. The FDA relied on national food consumption surveys to estimate food consumed per eating occasion for persons 4 years of age or older. FDA stated in the CFR that it relied on the USDA's Nationwide Food Consumption Surveys that were conducted in 1977-78 and 1987-88 to estimate serving size and that it considered the mean, median and mode of the consumed amount. If survey data were insufficient, FDA took various other sources of information on serving size of food into consideration including serving sizes used by manufacturers and grocers. Following this procedure, FDA established "reference amounts customarily consumed" (reference amounts) for 139 food product categories, and these values represent the amount of food customarily consumed at one eating occasion. Most of the reference amounts are for foods in a ready-to-eat form, i.e. "as prepared". In the case of cakes three categories were

established (1) cakes, heavy weight, (2) cakes, medium weight and (3) cakes light weight. The reference amount established by FDA for these three cakes types were 125, 80 and 55 g, respectively. These values are listed in a table that specifically notes that these values were primarily based on the FDA's analysis of the USDA Nationwide Food Consumption Surveys (NFCS) from 1977-1978 and 1987-88.

Since FDA completed its determination of reference values, dietary habits have changed and new USDA food consumption information has become available. Therefore, Exponent conducted a further analysis of serving sizes using the data that are available in the USDA's most recent national food consumption survey conducted in 1994-96, and 1998 (CSFII). We evaluated the current intake of fruit cake and also reviewed the USDA's opinions as to typical serving sizes of fruit cakes. The results of this research are presented below.

II. METHODS:

USDA Nationwide Food Consumption Data

USDA has regularly conducted surveys of food consumption practices in the United States including those used by FDA in its original development of reference values (the 1977-78 and 1987-88 nationwide surveys) and more recent surveys (called the Continuing Survey of Food Intake by Individuals (CSFII) and conducted in 1994-96, 1998).

The two earlier studies are now very out-dated and do not reflect current consumption practices. Further, a review of the reported consumption of fruitcake in 1987-88 survey that was used by FDA only 19 individuals reporting consuming fruit cake. Exponent attempted to determine more current estimates of fruit cake consumption by repeating the FDA procedures using the more recent USDA 1994-96, 98 CSFII to evaluate the consumption of fruit cake. Exponent's Foods and Residue Evaluation Program (FARE™) software was used in conjunction with the data from USDA's Continuing Survey of Food Intakes by Individuals (CSFII). In the CSFII, USDA collects food diary information (food and beverage consumption) for the U.S. population. The 1994-96 CSFII was conducted as three separate one-year surveys for the entire US population, while the 1998 supplemental survey sampled children up to 9 years of age over the course of one year (Supplemental Children's Survey). Approximately 16,000 individuals participated in the 1994-1996 CSFII survey and 5,300 children participated in the 1998 supplemental survey. All respondents are requested to provide two nonconsecutive days of consumption data.

Information on the amounts and kinds of foods and beverages consumed at home as well as away from home was collected by an in-person interviewer using a multiple-pass 24-hour recall. Quantities of foods and beverages consumed were recorded in household

measures and then converted to grams by USDA. There were approximately 6,000 foods reported in the survey database including more than 50 different foods that were categorized by USDA as cake. One survey code (531-10000) was specifically used by USDA to code respondent's consumption of fruit cake.

III. RESULTS:

A. USDA CSFII fruit cake consumption

Exponent followed the procedures described by FDA to determine typical serving sizes as reported in the most recent USDA CSFII (1994-96, 1998). Since only 19 individuals reported consuming fruit cake in the 1987-88 USDA survey and since these data are clearly too old to reflect current eating practices, only the most recent data are presented

Table 1

Intake of All Cakes and Fruit Cakes per eating occasion (grams/eating occasion) by respondents in the 1994-96, 1998 USDA CSFII

	No of Consumers	Mean	Median	90 th percentile
Fruit Cakes	15	91.3	107.3	144.2

Although the CSFII is based on more recent survey results, only 15 individuals reported consuming fruitcake. This is too few respondents to reliably estimate serving sizes for fruitcakes.

B. USDA Assumptions regarding serving size of cake

The USDA Agriculture Research Service (ARS) is responsible for creating and maintaining the national database on food composition including nutrient information. ARS also provides information about serving sizes for the foods for which nutrient information are available. This information, including the USDA National Nutrient Database for Standard Reference, Release 17, is available on the USDA website: (<http://www.nal.usda.gov/fnic/foodcomp/search/>).

In the primary database, **The National Nutrient Database for Standard Reference**, ARS reports that the serving size for 1 piece of fruit cake is 43 grams.

IV. DISCUSSION

Appendix B contains examples of the data that are available for cakes, including fruit cakes in the National Nutrient Database. Similar data is available on line for thousands of foods (<http://www.nal.usda.gov/fnic/foodcomp/search/>)

In the National Nutrient Database, bakery products represent categories that contain many foods with similar ingredients that are nonetheless quite different in terms of consumers' perception of a typical "serving size" as can be seen from the food descriptions and serving sizes reported in Appendix 1. In Table 2 of the 21 CFR CH I, 101.12, FDA defined three categories for cake (heavy, medium and light weight). FDA developed reference values for each of these categories. In specifying these and other food categories, FDA recognized some of these differences in types of cakes and developed different reference amounts for these categories as well as for many other foods in the bakery products category. For example, the reference amount for a brownie is 40 g, while the reference amounts for "cakes, heavy: and cakes, medium weight are 125 and 80 g respectively. The reference amount for coffee cakes including crumb cakes and Danish is 55 g. FDA did not evaluate fruit cakes as a separate category.

Nonetheless, fruit cake composition is substantially different from other cakes. It contains different ingredients and therefore has a different nutrient profile than other cake types. Therefore it should be anticipated that the serving size is likely to be quite different. Many other foods, such as brownies are assigned a separate reference value by FDA.

In Exponent's opinion, fruitcake is not similar to any of the other cakes described in the available government databases. Although it is somewhat more like some confections, it is not sufficiently similar to any confection product to be categorized together for the purposes of defining a typical serving size. Therefore, it is our opinion that the serving size should be established specifically for fruitcake. The possible approaches to defining a serving size are evaluated below:

A. Selection of a reference value for fruit cakes based on the CSFII Survey Results:

The reference amount specified by FDA in Table 2 of the CFR (21 CFR CH I, 101.12, Table 2) for fruit cake is 125 grams. The reference value is based on an initial analysis by FDA of data from the two national food consumption surveys (NFCS 1977-78 and 1987-88) and includes cakes that are not similar to fruit cake and would not be anticipated to be consumed in similar amounts.

Additional analyses of food consumption data to estimate serving sizes for fruit cakes as a separate category do not produce reliable estimates since only a few individuals reported eating fruit cake in the available surveys.

B. Selection of a reference value for fruit cakes based on the USDA's Estimate of Serving Size as part of its National Nutrient Database for Standard Reference, Release 17

The USDA maintains the only US national database of information about the level of nutrients in foods (The National Nutrient Database for Standard Reference). This database has been carefully compiled by experts at USDA and is widely used as the source of information about the nutrient components of foods in the US market. The current database is Release 17 and the individual serving size for fruit cakes in the database is 43 grams.

V. CONCLUSION

The default values selected by FDA for cakes appear to be extremely variable (26-125 grams). This variation reflects the broad range of products included under the words "cake." Exponent reviewed product labeling for a variety of cakes and of the serving sizes defined for different cake types in the USDA National Nutrient Database for Standard Reference. Although Fruitcake contains the word "cake" it is more like a confectionary product and it is sufficiently different from all other baked goods that it should be given a separate "reference value."

The data in the national food consumption surveys (CSFII) are inadequate to define the serving size for fruits cakes because too few individual's reported consuming fruit cake and the resulting data are not sufficiently reliable for this purpose.

The USDA reports in the National Nutrient Database for Standard Reference that the serving size for 1 piece of fruit cake is 43 grams. This value is consistent with product labels for fruit cakes served in a variety of package sizes from individual servings to large multi-serving cakes and should be used as the reference value.