ABSTRACT
USDA determines nutrient values for selected foods in the U.S. diet to update the USDA National Nutrient Database for Standard Reference. Label data are sometimes used for breakfast cereals when analytical data are unavailable. According to labeling regulation 21CFR 101.9(g), analytical values for fortification nutrients must be at least equal to label values, whereas naturally occurring nutrient values must be at least 80% of label values for “beneficial” nutrients (e.g., protein, dietary fiber, potassium, magnesium) or no more than 120% of label values for “nutrients to limit” (e.g., total fat, sugar, sodium). Manufacturers typically add overages to fortified foods to ensure that their products meet the FDA regulations. Six types of ready-to-eat breakfast cereals, selected based on consumption data and other factors, were analyzed as part of USDA’s National Food and Nutrition Analysis Program. Analytical iron results ranged from 3% to 80% of label values and vitamin D results were 5% to 128% of label values. Vitamin A results ranged from -3 to +175%. Most B vitamin results indicated overages of 7-112%, but thiamin and riboflavin were below label values in some cereals (-2 to -18%). Most “beneficial” nutrient results were at least 80% of label values, as required, although dietary fiber was below 80% for four of the cereals. Total fat results were >120% of label values for three of the cereals. Vitamin A and sugar results were all below 120%, as required. This study of breakfast cereals indicates that analytical values can vary widely when compared to values shown on the Nutrition Facts panel.

INTRODUCTION
The National Food and Nutrition Analysis Program (NFNAP) includes laboratory analysis of select foods to provide data for the USDA National Nutrient Database for Standard Reference. The Nutrient Data Lab has top-selling ready-to-eat (RTE) cereal products sampled and analyzed on a regular basis. Data derived from cereal package Nutrition Facts labels are sometimes used when analytical or manufacturer data are not available. The goal of this analysis was to compare the NFNAP analytical results from a 2011 sampling to the corresponding label values for the top-selling ready-to-eat (RTE) cereal products sampled and analyzed in a study of 12 cities across the United States, which were selected using a multi-stage probability-proportional-to-size method. Food Analysis Laboratory Control at Virginia Tech prepared sample method according to standard protocols and shipped composited samples to pre-qualified analytical laboratories along with quality control materials. Samples from different cities were combined in composite samples, resulting in 1 to 3 segments for each nutrient. Laboratories conducted analyses of proximate components, sugars, dietary fiber, vitamins, minerals, and fatty acids using AOAC or other validated, published methods.

METHODS
• Six brands of RTE breakfast cereal were sampled for analysis in summer 2011: bran flakes with raisins, crisp toasted rice, frosted corn flakes, multigrain flakes with oat clusters, oat rings, and toasted oat shapes with marshmallows.
• Cereals were selected based on FNHES 2007-08 consumption data, unit sales, and other factors.
• National Food and Nutrition Analysis Program [1] protocol.
• Each product was sampled from retail outlets in 12 cities across the United States, which were selected using a multi-stage probability-proportional-to-size method.

RESULTS & DISCUSSION
Fortified nutrients
The RTE cereals studied were all fortified with vitamins A, D, B1, B2, thiamin, riboflavin, niacin, and iron. Cereal manufacturers typically add amounts greater than the labeled amount in order to account for losses during processing and storage. These overages are demonstrated in this study’s results, shown in Table 1.

Most of the “beneficial” nutrients were at least 80% of the label value (Table 3), with the exception of fiber which had some low analytical values (indicated in red). Sodium and total sugar levels were no more than 120% of label (Table 4), thus falling below the FDA limit.

Table 1. Class I FDA labels: analytical results as percent of label values

Table 2. Class II fortified nutrients: analytical results as percent of label values

Table 3. Class IIa intrinsic “beneficial” nutrients: analytical results as percent of label values

CONCLUSIONS
• Label values provide a reasonable estimate of some, but not all, nutrient levels in RTE breakfast cereals.
• The extent of overages for some nutrients and deficits in other nutrients should be of interest to the cereal industry.
• Health professionals should be aware that cereal labels often provide underestimations of actual amounts of vitamins in processing.

REFERENCES