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Recent trends in ready-to-eat breakfast cereals in the U.S.[†]

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Abstract

Data in the USDA National Nutrient Database for Standard Reference (SR) were examined to discern trends in ready-to-eat breakfast cereals resulting from manufacturers' reformulations, many in response to public health concerns and consumer demand. The majority of the nutrient data for breakfast cereals in SR are supplied by manufacturers. Nutrient data and ingredients for Kellogg and General Mills ready-to-eat cereals within SR were examined, as those brands represent 62% of the U.S. market. Mean values for total sugar, total dietary fiber, and sodium were calculated for those manufacturers' breakfast cereals within SR releases 18 through 24 (2005–2011). Values from SR18 (n=120 products) were compared to those from SR24 (n=151 products) using unpaired Student's *t*-tests. Sugar levels fell from 27.5 to 24.8 g/100 g and sodium from 511 to 438 mg/100 g, a reduction of 10% (not significant; *p*=.057) and 14% (*p*<.05), respectively. Fiber levels rose from 7.1 to 9.4 g/100 g, a 32% increase (*p*<.05). Nutrient comparisons were made using paired *t*-tests on a subset of 83 products, which excluded cereals that had been added or dropped between SR18 and SR24. From 2005 to 2011, sugar and sodium levels decreased by 7.6% and 11.2%, respectively, while fiber levels increased by 13.4% (all *p*<.0001). Whole grain ingredients were found in at least 2/3 of the cereals examined in SR24. Trends observed in this important breakfast category demonstrate positive changes in the nutrient composition which may have an important impact on public health.

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1. Introduction

The USDA National Nutrient Database for Standard Reference (SR) is the foundation of most nutrient databases in the U.S. SR is continuously updated and released online once a year by the USDA's Nutrient Data Laboratory (NDL), Beltsville Human Nutrition Research Center, Agricultural Research Service. Sources of nutrient data for the 7,900 food items in SR Release 24 (2011) include analytical studies, food industry, food labels, and the scientific literature [1]. SR24 includes most ready-to-eat (RTE) breakfast cereals sold by major manufacturers. These cereals account for over 80% of U.S. retail sales. Over 2 billion units of RTE cereals were sold during a 52 week period ending in August 2011 [2]. Fortification of cereals varies widely, preventing the ability to use generic items in SR. Nutrient data for these brand name products are primarily derived from breakfast cereal manufacturers. Every few years a small number of RTE cereals with a high market share are selected for statistically representative nationwide sampling and nutrient analysis via the NDL's National Food and Nutrient Analysis Program (NFNAP) [3]. With each release, new cereals are added and discontinued products are removed from SR. The nutrient data are updated to reflect changes in formulation or fortification.

Data from the manufacturers indicate changes in breakfast cereal formulations. These may be due to several reasons, including response to public health concerns and consumer demand for healthier cereals. Diet-related chronic diseases, including cardiovascular disease and diabetes, are prevalent in the U.S. [4]. Public health concern led to the publication of the Dietary Guidelines for Americans, which was developed as a guide to healthy eating based on a thorough review of current scientific evidence. Key messages in the 2010 edition include "make half your grains whole" and "cut back on foods high in added sugars and salt" [4]. These guidelines have an impact on the formulations of breakfast cereals, because they consist of grains and frequently include sugar and salt. Consumer demand for healthier cereals may be another factor influencing recent trends in breakfast cereals. In a recent survey regarding breakfast cereal consumption conducted by the market research company, Mintel [5], 93% of respondents stated they eat RTE cereal. Whole grain was ranked the third most important attribute for selecting cereal. Fiber and sugar content were also important health attributes when selecting cereal [5].

The objective of this study was to examine data in SR for trends in RTE breakfast cereals, and determine the type and extent of manufacturers' reformulations of these cereals.

2. Materials & Methods

The market share figures for RTE cereals were used to determine the top-selling companies. Kellogg and General Mills represented 33% and 29% of RTE cereals in the U.S. market, respectively, based on unit sales from August 2010 to August 2011. Other major national brand and private label (store brand) unit sales comprised a total of 31% of the market [2]. This study was limited to Kellogg and General Mills products since together they represent the majority (62%) of RTE cereals in the U.S. market. These cereal manufacturers have partnered with NDL to provide up-to-date nutrient data and ingredients lists annually for use in SR [1]. Most of the data used in this analysis (91%) were supplied by General Mills and Kellogg (about one fourth of which are Kashi brand products). A small portion of nutrient values (6%) were determined by lab analyses conducted through NFNAP. This study compared changes in three nutrients – total sugar (including natural sugar contained in raisins and other dried or dehydrated fruit), total dietary fiber, and sodium -- since these were areas of public health concern and a major emphasis of cereal manufacturers' health initiatives.

Levels of sugar, fiber, and sodium were examined in RTE cereals, on a 100 g basis, from SR release 18 (SR18, 2005) through SR release 24 (SR24, 2011). Data were limited to those years in order to examine the most recent trends. RTE cereals with "General Mills," "Kellogg," or "Kashi" in the food description were identified. The overall mean values for sugar, fiber, and sodium were calculated for all of the Kellogg and General Mills RTE cereals in each of the seven most recent releases of SR -- 18

through 24. Unpaired Student's t-tests were performed to compare SR18 (n=120 products) with SR24 (n=151 products). After overall trends were noted for the three nutrients, values from SR18 were compared to values for SR24 using paired t-tests (SAS version 9.2, SAS Institute, Inc, Cary, NC) for a subset of Kellogg and General Mills RTE cereals which were included in both of those releases (n=83). Thus, those products which had been added or dropped from SR between releases 18 and 24 were excluded from the paired analyses. Significance was set at $p < 0.05$ for all analyses. The RTE cereal ingredients lists submitted by Kellogg and General Mills in late 2010 were examined for new and common trends, focusing on the use of whole grains, and types of bran and other fiber ingredients.

3. Results & Discussion

3.1. Trends in sugar, fiber, and sodium

The mean sugar, fiber, and sodium values, along with number of data points, standard deviation, and range of values, for Kellogg and General Mills RTE cereals in SR18 through SR24 are shown in Table 1.

Table 1. Sugar, fiber, and sodium results for General Mills and Kellogg RTE breakfast cereals in SR18 through SR24

SR	Sugar, g/100 g (range 0-56)			Fiber, g/100 g (range 0-50)			Sodium, mg/100 g			
	Mean	N	Std Dev	Mean	n	Std Dev	Mean	n	Std Dev	Range
18	27.5	119	13.3	7.1	120	8.2	511	120	256	0-970
19	28.1	142	13.2	7.2	143	4.5	481	141	240	0-970
20	28.1	142	13.1	7.2	141	7.6	487	139	234	0-970
21	26.9	141	12.6	7.7	141	7.6	472	141	232	0-933
22	25.6	123	12.5	8.2	124	7.9	476	122	233	0-933
23	25.4	137	11.2	9	137	7.7	445	137	219	0-910
24	24.8	151	10.1	9.4	151	7.6	438	151	207	0-889

The sugar level in Kellogg and General Mills RTE cereals decreased by 10% during the entire study period (i.e., SR18 to SR24). This was not a significant decline ($p = .057$) (Figure 1). However, the sugar level decreased significantly ($p = .017$) by 12% from SR19 (2006) to SR24 (2011). The decline reflects the focus of General Mills and Kellogg to reduce sugar levels in their cereals [6,7].

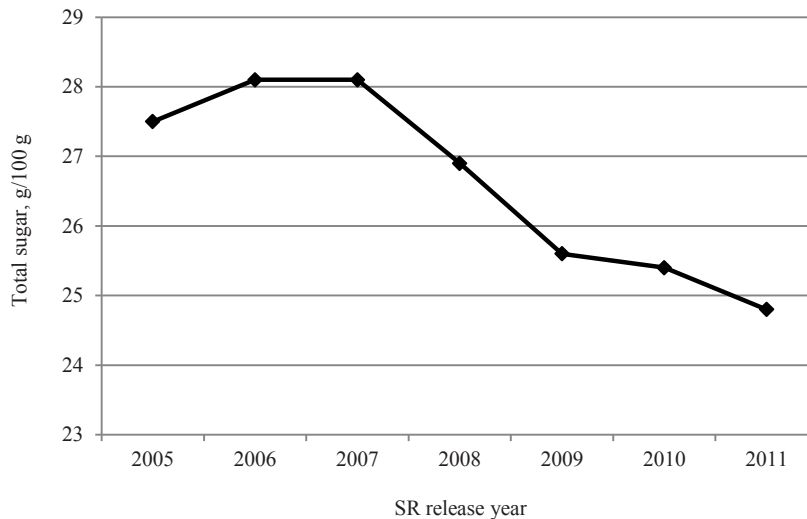


Fig.1. Trend for total sugar in RTE breakfast cereals. Mean values for General Mills and Kellogg cereals within USDA Standard Reference (SR) nutrient database.

From SR18 to SR24, fiber content increased by 32% ($p=.018$) (Figure 2). This increase reflects manufacturers' goals to increase the fiber level in many of their products [7]. The 2010 Dietary Guidelines Advisory Committee concluded there is a moderate amount of evidence that suggests dietary fiber is essential for digestive health and reduces the risk of cardiovascular disease, obesity, and type 2 diabetes [8]. Yet, adult fiber intakes are 40 to 50% below the recommended levels [9, 10].

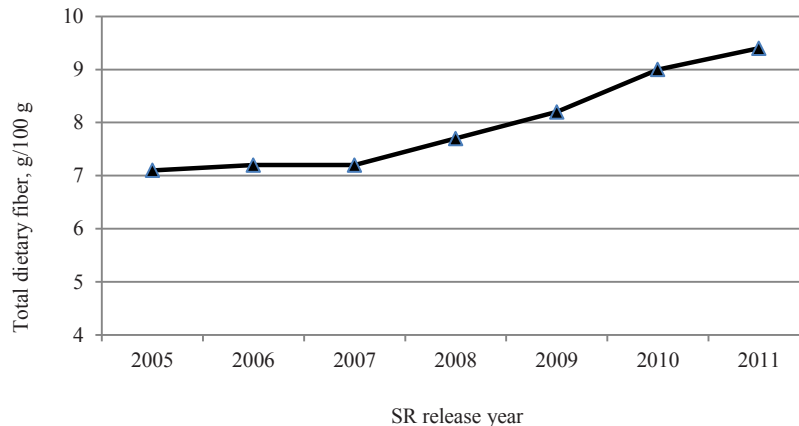


Fig.2. Trend for total dietary fiber in RTE breakfast cereals. Mean values for General Mills and Kellogg cereals within USDA Standard Reference (SR) nutrient database.

From 2005 to 2011, sodium content of RTE cereals declined by 14% ($p=.01$). The reduction in sodium levels, reflecting reformulation of many Kellogg and General Mills cereals [6,11], is illustrated in Figure 3. A strong body of evidence shows reduced blood pressure with lower sodium consumption [12]. Thirty-four percent of adults have hypertension, which is a strong risk factor for stroke, coronary heart disease, and kidney disease. The *Dietary Guidelines for Americans, 2010* recommend a sodium intake of < 2,300 mg per day, or 1,500 mg for at-risk groups [4], but the average sodium intake in the U.S. is closer to 3,500 mg per day for males and females 2 years old and older [9].

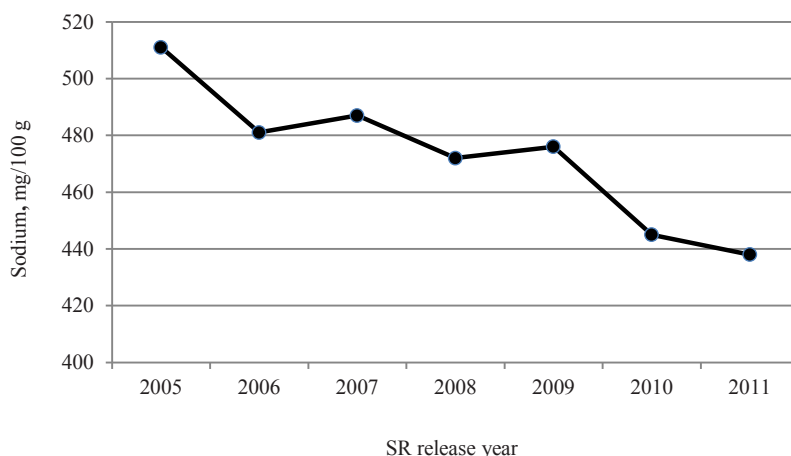


Fig.3. Trend for sodium in RTE breakfast cereals. Mean values for General Mills and Kellogg cereals within USDA Standard Reference (SR) nutrient database.

3.2. Paired comparisons for sugar, fiber and sodium

In the subset of 83 matched Kellogg and General Mills RTE cereals that were included in both SR18 (2005) and SR24 (2011), sugar content declined by 7.6%, fiber levels increased by 13.4%, and the sodium level decreased by 11.2%, all significant at $p < .0001$. These paired analyses more clearly illustrate the nutrient changes in the companies' products. As shown in Table 2, the mean change for most of the 83 cereals indicates an increase or decrease in sugar, fiber, and/or sodium content, while others showed no change in those nutrient levels. There was a higher percentage of cereals with reductions in sugar and sodium (52% and 58%, respectively) than increases (22% and 16%, respectively). The magnitude in reduction was greater than the magnitude in increase. For example, the maximum increase in sugar level was only 4.5 g/100 g versus a larger maximum decrease of 16.7 g/100 g. More cereals increased in fiber (51%) than decreased (19%). The reasons for the small increases in sugar and sodium and decreases in fiber are unknown, but may be the result of specific product reformulations. Figure 4 illustrates the extent of increases and decreases in fiber in each of the 83 cereals between SR18 and SR24.

3.3. Trends in ingredients

The amount of whole grains in foods is not currently tracked in SR, which precluded accumulation of consistent quantitative data on the whole grain level in the RTE cereals, and is a limiting factor in this study's analysis. A review of 2010 ingredients in Kellogg and General Mills RTE cereals indicated the use of "whole grain" in the ingredients was very common -- found in at least two thirds of the products. Ingredient sources of fiber other than whole grains included oat fiber, corn bran, inulin or chicory root fiber, and soluble corn fiber. The fiber content of whole grains may be relatively high compared to their processed, refined counterparts. Other potential benefits of consuming whole grains are lower body

weight and protection against cardiovascular disease [12], yet whole grain intake in the U.S. is falling short of the recommendations [12,13].

Table 2. Detailed comparison of nutrient values in RTE cereals between SR18 and SR24 (n=83; Paired *t*-test)

	Mean change, per 100 g	Range of change, per 100 g	Number of products (%)
Sugar: No Change	0 g	0 g	22 (27)
Sugar: Decreased*	4.3 g	0.1 to 16.7 g	43 (52)
Sugar: Increased	1.0 g	0.1 to 4.5 g	18 (28)
Fiber: No Change	0 g	0 g	25 (30)
Fiber: Decreased	1.0 g	0.1 to 2.7 g	16 (19)
Fiber: Increased*	2.5 g	0.1 to 8.2 g	42 (51)
Sodium: No Change	0 g	0 mg	22 (27)
Sodium: Decreased*	114 mg	1 to 655 mg	48 (58)
Sodium: Increased	48 mg	1 to 250 mg	13 (16)

* $p < .0001$

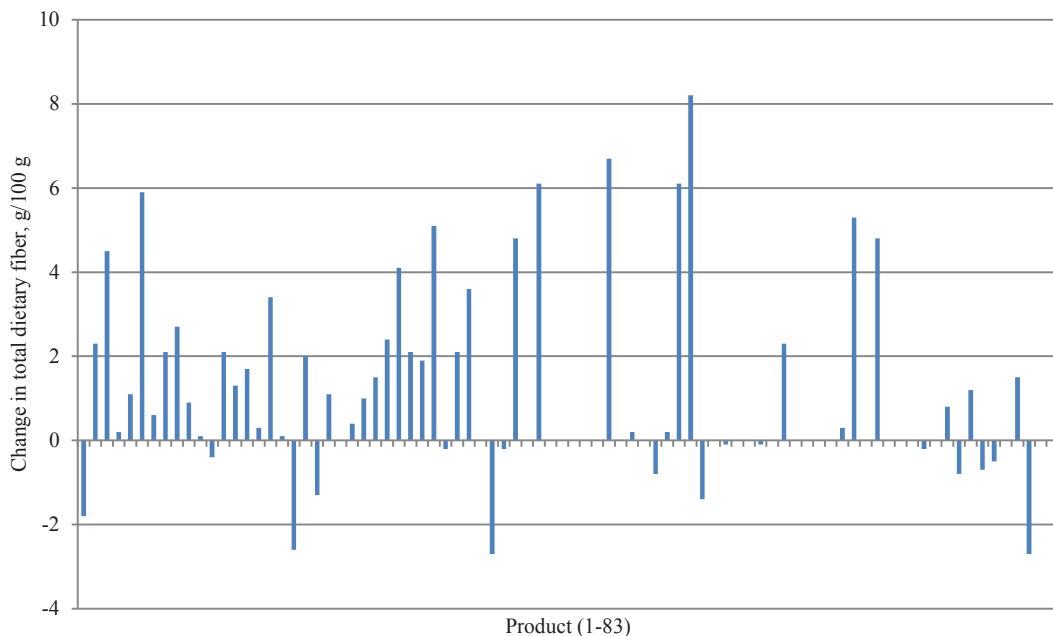


Fig.4. Changes in dietary fiber between SR18 and SR24 in 83 RTE breakfast cereals

The present study has some limitations. National brands other than Kellogg and General Mills and store brand cereals/data were excluded from the analyses due to lower market share. SR24 contains over 80 of the other national brand products and several “generic” RTE cereal items. A study of possible nutritional profile changes in those cereals may be of interest. Not all cereals are updated in SR each year due to limited resources. Emphasis is given to cereals with the highest sales volume. Another study limitation was the wide range of sugar, fiber, and sodium levels among products, thus impacting the

potential for change in these products. For example, products with very high initial fiber values are probably less likely to increase their level compared to products with very low initial values. Lastly, although most of the changes in nutrient values for breakfast cereals in SR are a result of product reformulations, some of the changes are due to improved food composition data [14].

4. Conclusions

The RTE cereal data in SR from 2005 through 2011 substantiate the breakfast cereal manufacturers' initiatives to proactively improve the nutrient composition of their cereals, often in response to public health concerns and consumer demands. Decreases in sugar levels were significant for the subset of same products, but not significant for the larger data set. Fiber levels increased significantly and sodium levels decreased significantly. An increase in whole grain was indicated by the products' ingredients lists. NDL will continue to track these trends and product reformulations through annual updates to SR, using the important contributions of data from cereal manufacturers and USDA-generated analytical data.

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