

## What Is the State of the Current Grains Environment?

B. JAN-WILLEM VAN KLINKEN, MD, PH.D., MSC.<sup>1</sup>

Global trends show a dramatic increasing trend in overweight and obesity. Mean body mass index (BMI) increased by 1.1 to 1.4 kg/m<sup>2</sup> between 1980 and 2008 (4), paralleled by a mean global increase in diabetes from 153 to 347 million (1). Changes in lifestyle, and most importantly diet, nutrition, and physical exercise, form an essential explanation for this rise in this and other chronic diseases. The joint WHO/FAO (16) concluded that “healthy diets and physical activity are key to good nutrition and necessary for a long and healthy life” and that “people should enjoy fruits, vegetables, and legumes, and select foods from plant and marine origin.” Whole grains are part of a healthy diet. Several epidemiological studies have already demonstrated that regular consumption of a diet rich in whole grain (WG) results in a lower prevalence of chronic disease (2, 13, 19). Meta-analyses showed that risk for type 2 diabetes mellitus and cardiovascular disease decreased by 6% to 1% and less weight gain occurred when 3–5 servings were consumed daily over 8–13 yrs compared to never/rare WG consumers (19). Additionally there is evidence emerging for the beneficial effects of WG consumption on glucose metabolism in healthy and compromised populations, satiety, and enhanced performance as well as beneficial effects on microbiome and host interactions. Despite this evidence, intake levels of WG are—in some cases far—below dietary recommendations, which is of concern. In the United States, median whole grain intake is only 20% of that recommended by the U.S. Dietary Guidelines Advisory Committee, whereas intake of solid fats/added sugars and refined grains far exceeds the recommendations (12,18). Only about 1% of U.S. children meet recommended WG intakes (9); instead, a large proportion of consumed grains are refined.

There are several barriers and opportunities to increase WG intake: 1) There is a lack of international scientific consensus on what constitutes a WG food, 2) there is a need for international harmonization and inclusion of dietary recommendations for WG in national dietary guidelines, 3) we must address the declining consumer interest in carbohydrates, and 4) there needs to be enhanced options for distribution channels of WG foods.

### Scientific Consensus on What Constitutes a WG Food and

**Use of Similar Definitions in Surveys.** An accepted definition of WG by AACC International (17) states WG as “the intact, ground, cracked, or flaked caryopsis whose principal anatomical components—the starchy endosperm, germ, and bran are present in the same relative proportions as they exist in the intact caryopsis (i.e., the grain).” Although this scientific definition is frequently used and accepted in international context, it does not describe how much WG a food needs to contain in order to qualify as “whole grain.” In the United States, the whole grain stamp was developed to help identify the content of WG in a particular food. However, WG is not included in the nutrition label in any country, leading to a lack of clarity on how many grams of WG are actually present in a particular food. Epidemiological surveys in international literature use different definitions to classify foods as WG foods which makes comparison of actual intake data between surveys problematic. A more reasonable approach would be to use grams of WG. A consensus on how to measure WG intake effectively and consistently needs to be developed and biomarkers need to be identified that can reliably reflect WG intake.

**International Harmonization and Inclusion of Dietary Recommendations for WG in National Guidelines.** Dietary recommendations vary greatly between countries or, in most cases, are not available. Only few countries report WG as part of their national survey results. When available, numerical targets for WG intake vary between countries from 16 to 115 grams per day (8,17). Assessment of food-based dietary guidelines in the European region showed that only 8 out of 49 countries have a recommendation to specifically increase WG intake (6). The *U.S. Dietary Guidelines for Americans 2010* states that WG intake needs to be increased and gives a number of examples how to increase and meet the 48 gram per day target. Recommendations for Nordic countries, historically the greatest WG consumers, are based on caloric needs and vary between 62 and 75 g/day (10,11) for women and men respectively, whereas other countries have either higher or much lower recommendations. The basis for this discrepancy is unclear. Clearly, an understanding is needed to develop a globally accepted recommended intake for WG.

**Addressing the Declining Consumer Interest in Carbohydrates.** Adequate dietary intake of WG has become increasingly challenging (5) due to, for example, consumer perception of carbohydrates as “bad” (14). In addition, barriers exist because of increased consciousness about calories and a misunderstanding of gluten-free dieting. U.S. consumption of wheat

<sup>1</sup> PepsiCo Global R&D Nutrition. E-mail: [jan-willem.vanklinken@pepsico.com](mailto:jan-willem.vanklinken@pepsico.com).

products that often contain whole grains—such as breads, pastas, and pizza—dropped sharply beginning in 2000, reversing a three-decade trend of growth (3). Education will help consumers to make a distinction between types of carbohydrates (i.e., simple and complex carbohydrates and fibers) and will help them to understand the benefits of grain sources with gluten for those without celiac disease, as well as the disadvantages of low carbohydrate diets.

### Enhancing Options for Distribution Channels of WG Foods.

Although general consumer understanding on whole grains is lacking, awareness and popularity of whole grain foods in out-of-home channels in the United States seem to be increasing. Family meals contained WG are among the top 20 trends as surveyed among chefs by the National Restaurant Association for 2012 (15). Market trends show ample opportunity for out-of-home channels, for example, for breakfast. An example is the increasing popularity of hot oatmeal cereal (which is high in WG) at Starbucks, Dunkin' Donuts, and other outlets. School meal programs form an excellent target for increasing WG intake. Modeling showed that modest substitution of WG for a proportion of refined grain ingredients of commonly consumed school foods (breads and rolls, pizza, breakfast cereals, rice, and pasta) can increase WG intake from 0.5 to 2.2 oz/day (7) without changing the sensorial aspects of these foods. Clearly, helping the younger generation in meeting their WG intake recommendations will be an effective way to promote healthful eating in this age group.

In conclusion, specific consumer targeted approaches, including education and nutrition labeling and even subtle changes in the daily diet, may be successful in increasing WG intake. This is a significant opportunity where the public and private sector can effectively collaborate. A consensus on how to measure WG intake effectively and consistently needs to be developed and biomarkers need to be identified that can reliably reflect WG intake. Finally, an understanding needs to be created of what research is needed to develop a globally accepted recommended intake for WG.

*B. Jan-Willem van Klinken is an employee of PepsiCo Inc. The views expressed in this article are those of the author(s) and do not necessarily reflect the position or policy of PepsiCo, Inc.*

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