Obesity—Destiny or Chance? A Brief Perspective on the Benefits of Fiber Concentrates

Anne Fischer[1]
J. Rettenmaier & Söhne, Rosenberg, Germany

What are the reasons behind the growing numbers of overweight and obese people in many countries? According to World Health Organization (WHO) statistics, in 2016 more than 1.9 billion adults worldwide were overweight, and 650 million were obese. Moreover, at least 2.8 million people die each year of diseases related to being overweight or obese (9). As a consequence, in the European Union today ~7% of national budgets is dedicated to the treatment of diseases that are associated with overweight and obesity, such as certain forms of cancer, metabolic disorders, diabetes, and cardiovascular diseases (10).

How has obesity become such an epidemic? Gaining weight results from an imbalance between energy intake and energy expenditure—too many calories are consumed while not enough energy is expended in physical exercise. Exercising more is generally in the hands of individuals themselves; however, the amount of calories consumed could potentially be reduced if processed foodstuffs produced by the food industry contained fewer calories from fat and sugar. So, what properties do such newly formulated food products have to have to win over consumers? The answer is simple: they need to have the same sensory properties (e.g., look, taste, and feel) as the food products with which consumers are familiar (Fig. 1).

One way foodstuffs can be reformulated to make them healthier is by adding fiber (Fig. 2). Fiber concentrates are a by-product of large-scale industrial processing. Various raw materials, ranging from brans to other by-products from food and agriculture production, can be processed into insoluble fiber concentrates; according to estimates, total production is around 250,000 tons/year worldwide. Fibers can reduce the energy density of foodstuffs when used as substitutes for more energy-dense macronutrients such as fat. In the 1970s, Burkitt and Trowel identified the reason for the spread of certain diseases and health problems in industrialized countries: the replacement of traditional nutrition (products rich in fibers) with a diet containing more processed foodstuffs that are higher in sugar, protein, and fat (1).

One example of this change is the greater use of refined flour instead of whole grain flour in food products. Whole grain products contain significant amounts of fiber, as well as minerals and vitamins. For 100 g of whole grain wheat bread the energy content is 204 kcal, while for 100 g of white toasting bread the energy value is 262 kcal (4). Furthermore, one slice (55 g) of whole grain bread contains 4.4 g of dietary fiber, while the same amount of white bread (formulated with refined flour) provides only 1.6 g of dietary fiber (4).

In response to increasing overweight and obesity rates, as well as their associated diseases, as a consequence of these changes in our diets and based on our knowledge of the benefits of consuming whole grains and fibers, it would be reasonable to assume that consumers would (re)turn to eating more whole grains and fewer foods formulated with refined flour. Unfortunately, trends reveal that year-to-year consumption of less-healthy refined grain products is not decreasing, but is instead increasing. Consumers often favor breads that have a light color, soft and fluffy crumb, and light flavor over darker, more dense, and more bitter tasting whole grain products (Fig. 3). This consumer preference is mirrored in daily dietary fiber intake levels, which are well below nutritional reference values. In Germany, the recommended daily fiber intake is 30 g/day, but average intake has stagnated below 20 g, leaving a fiber gap of a bit more than 10 g/day (2). The United States has an even lower intake, with an average of only 16 g of fiber/day (6), well below the DRI (Dietary Reference Intake) of 25 g for women and 38 g for men (3). Clearly there is still a long way to go to bridge the gap between current fiber intakes and official recommendations. Refined grain products, like white sandwich or baguette breads, have become the dominant foodstuffs of our daily diets. The

Fig. 1. Bread basket.

[1] Head of Global Nutrition, J. Rettenmaier & Söhne, Holzmühle 1, D-73494 Rosenberg, Germany.
E-mail: anne.fischer@jrs.de

https://doi.org/10.1094/ CFW-63-4-0149

challenging question is, how can we increase fiber intake, while meeting consumer expectations in terms of sensory properties, since consumers show a strong preference for refined grain products? Producing a healthier alternative that is not actually consumed will not provide any benefits; acceptance by consumers of healthier alternatives is key!

Fig. 2. Oat fiber from oat hull.

Healthier alternatives are already available that enable development of foods that combine the sensory characteristics of traditional products with beneficial nutritional adjustments. For instance, it is technologically feasible to create a low-fat, high-fiber sausage that does not differ in appearance or taste when compared with traditional sausages. Various examples from different food categories, such as low-fat mayonnaise, high-fiber white bread rolls, and reduced-fat burgers, already exist or are technologically possible and ready to be marketed. If this is the case, why are the offerings of such products still so limited? Intensive efforts to promote increased consumption of vegetable, fruit, and wholemeal products have not reduced or eliminated the existing fiber gap. To meet the nutritional needs of consumers while understanding and respecting their habits and preferences, a "combined strategy" is required. Many consumers simply expect to continue consuming familiar food products and have no plans to make major change in their diets. If their favorite foods are made available in healthier, lower calorie, higher fiber forms, then these new offerings will provide a real alternative to traditional foods, but only if there is no compromise required with regard to taste or appearance.

Despite their benefits, there is still criticism and discussion concerning whether the nutritional benefits of fiber concentrates are lower compared with whole grains. The fact is fiber concentrates do present clear and recognized benefits. Although they may not contain all of the nutrients found in whole grains, for instance they have lower mineral and vitamin contents, evidence-based human intervention studies have demonstrated their positive effects. Extracted insoluble wheat and oat fibers have been shown to have a positive influence on blood glucose response (7,8) and laxation (5). It is also argued that if people paid more attention to their dietary choices (e.g., eating more vegetables, wholemeal products, nuts, fruits, etc.), fiber supplements in other foods would not be necessary.

The reality is that we like to view ourselves as responsible and health-conscious consumers; however, this simply does not re-

Fig. 3. White bread versus whole wheat bread.

flect the existing market trends and consumption habits. In Germany, even with a long-standing tradition of consuming wholemeal breads, the daily fiber intake is less than 18 g for women and less than 19 g for men—well below the German Society for Nutrition's recommendation of 30 g/day for healthy adults (2) or 40 g/day for diabetics. It appears there is a need for tasty, appealing, high-fiber products that people can enjoy rather than low-fiber or grain and bran products that are not sufficiently palatable. Recommended fiber intake goals can be met more easily by more people with the use of fiber concentrates. This option does not offer a carte blanche for consumers to not improve their eating habits, but rather should encourage them to be more selective and sensible in their choice of foods. They should be aware of what they eat, remembering to include vegetables, fruits, and whole grains, as well as to choose fiber-enriched products when needed.

The potential for the development of products that taste good and contain fewer calories and less fat is enormous, with great potential for improving our nutrition. When looking at the eating habits of the general population, offering more of these types of products on supermarket shelves would certainly make sense. The advantage of fiber concentrates, as opposed to brans, which have been promoted heavily in the past without achieving any real breakthrough, is their versatility—they can be used in a very wide range of foodstuffs without any negative impact on taste and texture. In some applications, they can even improve texture. Fiber concentrates also have significantly higher dietary fiber contents, a longer shelf-life, and do not have the downside of sources such as wheat bran that may contain higher levels of mycotoxins or other contaminants. In addition, fiber concentrates offer clear technological benefits for use in bakery applications. Products that are rich in fiber and light in color, with no negative effect on taste and appearance, can be easily created. A white baguette that is enriched with fiber and has the same appearance and sensory properties as the traditional standard is possible. To claim that a food is a "source of fiber," 3 g of fiber/100 g of end product is required; for a declaration that a food is "high in fiber," the requirement is 6 g of dietary fiber/100 g of end product.

The proven nutritional benefits of all existing forms of fiber should help to increase daily intake through their use in a broader range of processed foodstuffs. This requires further encouragement and adoption of recommendations by institutions, leaders, influencers, and the media. Campaigns like "Five A Day," which is endorsed by the German Society for Nutrition (DGE), are a step in the right direction. As a world leader in the production of insoluble fiber concentrates, J. Rettenmaier & Söhne works in close collaboration with project partners in the German Federal Ministry of Education and Research (BMBF) Clusters on Nutrition. This partnership continuously adds to the number of fiber-based solutions and innovations that are available, with the aim of helping the food industry produce healthier products that meet customer expectations.

References

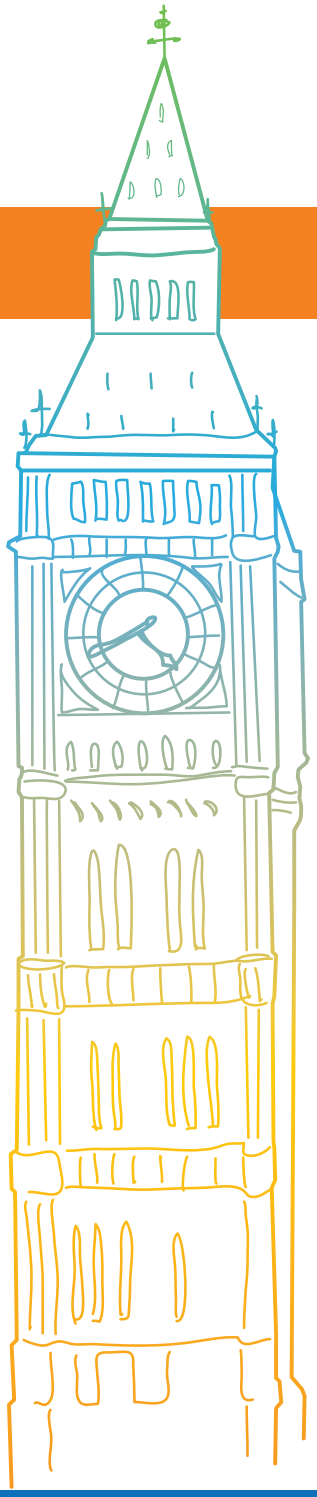
1. Burkitt, D. P., and Trowell, H. C. *Refined Carbohydrate Foods and Disease, Some Implications of Dietary Fibre*. Academic Press, London, 1975.
2. Deutsche Gesellschaft für Ernährung. Ernährungssituation in Deutschland. In: *12. Ernährungsbericht 2012*. Published online at www.dge.de/wissenschaft/ernaehrungsberichte/ernaehrungsbericht-2012/kapitel-1. DGE, Bonn, 2012.
3. EFSA Panel on Dietetic Products, Nutrition, and Allergies (NDA). Scientific opinion on dietary reference values for carbohydrates and dietary fibre. EFSA J. 8(3):1462, 2010.
4. Elmadfa, I., Aign, W., Muskat, E., and Fritzsche, D. *Die Große GU Nährwert Kalorien Tabelle*. Gräfe und Unzer Verlag GmbH, Munich, 2008.
5. Feldheim, W., and Wisker, E. Untersuchungen zur Verbesserung der Ballaststoffaufnahme. Dtsch. Lebensm.-Rdschundsch. 96:327, 2000.
6. Hoy, M. K., and Goldman, J. D. Fiber intake of the U.S. population. What we eat in America, NHANES 2009-2010. Published online at www.ars.usda.gov/ARSUserFiles/80400530/pdf/DBrief/12_fiber_intake_0910.pdf. U.S. Department of Agriculture, Agricultural Research Service, Food Surveys Research Group, Beltsville, MD, 2014.
7. Weickert, M. O., Möhlig, M., Schöfl, C., Arafat, A. M., Otto, B., Viehoff, H., Koebnick, C., Kohl, A., Spranger, J., and Pfeiffer, A. F. Cereal fiber improves whole-body insulin sensitivity in overweight and obese women. Diabetes Care 29:775, 2006.
8. Weickert, M. O., Roden, M., Isken, F., Hoffmann, D., Nowotny, P., et al. Effects of supplemented isoenergetic diets differing in cereal fiber and protein content on insulin sensitivity in overweight humans. Am. J. Clin. Nutr. 94:459, 2011.
9. World Health Organization. 10 facts on obesity. Published online at www.who.int/features/factfiles/obesity/en. WHO, Geneva, 2017.
10. World Health Organization. Obesity: Preventing and managing the global epidemic. Report of a WHO consultation (WHO Tech. Rep. Ser. No. 894). Published online at www.who.int/nutrition/publications/obesity/WHO_TRS_894/en. WHO, Geneva, 2000.

Anne Fischer graduated with a diplom oecotrophologin (Dipl. Oec.troph) degree from the Rheinische Friedrich-Wilhelms-University Bonn, Germany. From 2008 to 2014 she was employed by J. Rettenmaier & Söhne GmbH & Co. KG as the area sales manager for the Germany, Spain, and Greece region and managed specific nutrition topics as project manager nutrition. Since 2014 Anne has been head global nutritionist, BU Food, at J. Rettenmaier & Söhne GmbH & Co. KG, responsible for all nutritional intervention studies and trials. She leads cooperative projects with universities and manages all research requests and projects on dietary fibers and their impact on health.

CEREALS & GRAINS 18

October 21 – 23
Hilton London Metropole
London, United Kingdom

ACT NOW! Register for the Cereal Science Event of the Year!



Learn, Collaborate, and Innovate with the best and brightest in the grain-based foods industry at Cereals & Grains 18!

Keynotes:

Opening Keynote Speaker

Leading from an Illustrious Past into a Demanding Future
Achim Dobermann
Director & Chief Executive, Rothamsted Research

Monday Keynote Speaker

Digitalization to Revolutionize: The Grain Value Chain of the Future
Ian Roberts
Chief Technology Officer, Bühler Group

Closing Keynote Speaker

Nutrition as a Driver of Health & Wellbeing
Walter De Man
Nutrition and Scientific & Regulatory Affairs, Mars Food

aaccnet.org/meet | #CerealsGrains18 #AACCI2018

Get all the latest updates for Cereals & Grains 18. Follow AACCI!

AACC INTERNATIONAL