FOODDRINK EUROPE

FoodDrinkEurope
Whole grains and fibre

The basics

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Contents

Background

A diet high in whole grains and/or fibre is associated with well-documented benefits to human health.[1] Yet, the majority of European adults do not consume adequate amounts of fibre.[2] By offering products high in whole grains and/or fibre, the EU food and drink industry can positively impact consumer nutrition and long-term health.

Further learning

- CEEREAL Statement on whole grain
- CEEREAL Statement on dietary fibre

Definitions

There is no legal definition of whole grain or whole grain products at the European level. EU Regulation 1308/2013 simply refers to whole grains as "grains from which only part of the end has been removed, irrespective of characteristics produced at each stage of milling." Examples include barley, black and brown rice, bulgur (cracked wheat), farro, millet, oats and quinoa. Whole grain food products include whole grain breakfast cereals or cereal bars, biscuits, oatmeal, muesli, popcorn, whole-wheat bread, pasta and crackers.

Austria, Belgium, Czech Republic, Denmark, Finland, Lithuania, the Netherlands, Norway, Portugal, Spain, Sweden, and Switzerland all have national definitions for whole grain as an ingredient. These definitions are aligned but not harmonised. However, the Whole Grain Initiative published in 2023 definitions for whole grains and foods containing them that have been ratified by leading, international

1 Reynolds, A., Mann, J., Cummings, J. H., Winter, N., Mete, E., & Morenga, L. T. (2019). Carbohydrate quality and human health: a series of systematic reviews and meta-analyses. *The Lancet*, 393(10170), 434–445. https://doi.org/10.1016/s0140-6736(18)31809-9

2 Stephen, A. M., Champ, M., Cloran, S. J., Fleith, M., Van Lieshout, L., Mejborn, H., & Burley, V. J. (2017). Dietary fibre in Europe: current state of knowledge on definitions, sources, recommendations, intakes and relationships to health. *Nutrition Research Reviews*, 30(2), 149–190. https://doi.org/10.1017/s095442241700004x

scientific associations:[3] "Whole grains shall consist of the intact, ground, cracked, flaked or otherwise processed kernel after the removal of inedible parts such as the hull and husk; all anatomical components, including the endosperm, germ, and bran must be present in the same relative proportions as in the intact kernel. A whole grain food shall contain at least 50% whole grain ingredients based on dry weight. Foods containing 25–50% whole grain ingredients based on dry weight, may make a front-of-pack claim on the presence of whole grain but cannot be designated 'whole grain' in the product name."

Fibre is defined by EU Regulation 1169/2011 as "carbohydrate polymers with three or more monomeric units, which are neither digested nor absorbed in the human small intestine and belong to the following categories:

- edible carbohydrate polymers naturally occurring in the food as consumed
- edible carbohydrate polymers which have been obtained from food raw material by physical, enzymatic or chemical means and which have a beneficial physiological effect demonstrated by generally accepted scientific evidence
- edible synthetic carbohydrate polymers which have a beneficial physiological effect demonstrated by generally accepted scientific evidence."

In practical terms, dietary fibre consists of carbohydrates from edible plant parts that are not broken down in the small intestine and pass into the large intestine (colon) where they are partially or fully fermented. Fibre is naturally present in whole grains, pulses, cereals, nuts, vegetables, and fruits but it can also be added during the manufacturing process to food products, such as baked goods, drinks, beverages, and meats.

3 Van Der Kamp, J., Jones, J. M., Miller, K. B., Ross, A. B., Seal, C., Tan, B., & Beck, E. (2021). Consensus, Global Definitions of Whole grain as a food ingredient and of Whole grain Foods presented on behalf of the Whole Grain Initiative. *Nutrients*, 14(1), 138. https://doi.org/10.3390/nu14010138

Benefits

"Shifting a substantial portion of global grain consumption to whole grains is potentially one of the most significant and achievable improvements to diets and food systems worldwide," concludes a 2022 scientific review.[4] That's because whole grains are high in fibre and contain other nutrients, such as protein, vitamins, minerals, antioxidants and phytochemicals. High intake of whole grains can lead to a reduction in bodyweight, total cholesterol, systolic blood pressure, inflammation as well as improve gut microbiome. As a result, consistent whole grain consumption has been associated with decreased morbidity and mortality from colorectal cancer, cardiovascular disease, and type 2 diabetes.[5] [6] [7] [8]

High dietary fibre intake is similarly associated with lowering the risk of these non-communicable diseases as well and maintaining digestive health. It has shown to have favourable effects in regulating digestion and absorption, bulking, transit time and microbiota in the gut.[9] Comprehensive data[1] suggest a 15–30% decrease in all-cause and cardiovascular-related mortality, incidence of coronary heart disease, stroke incidence and mortality, type 2 diabetes and colorectal cancer when comparing the highest dietary fibre consumers with the lowest. Additional benefits include significantly lower bodyweight, systolic blood pressure, and total cholesterol.

Some fibre in whole foods may have prebiotic properties, whereby it feeds good gut bacteria. Examples of such foods are garlic, onions, asparagus, bananas, oats and wheat bran. According to the International Scientific Association for Probiotics and Prebiotics, most prebiotics for the gut require an intake of 3 grams per day to elicit an effect.[10]

4 Milani, P., Torres-Aguilar, P., Hamaker, B. R., Manary, M., Abushamma, S., Laar, A., Steiner, R., Ehsani, M., De La Parra, J., Skaven-Ruben, D., De Kock, H. L., Hawkes, C., Covic, N., Mitchell, C., & Taylor, J. R. (2022). The whole grain manifesto: From Green Revolution to Grain Evolution. *Global Food Security*, 34, 100649. https://doi.org/10.1016/j.gfs.2022.100649

5 Hu, Y., Ding, M., Sampson, L., Willett, W. C., Manson, J. E., Wang, M., Rosner, B., & Hu, F. B. (2020). Intake of whole grain foods and risk of type 2 diabetes: results from three prospective cohort studies. BMJ, m2206. https://doi.org/10.1136/bmj.m2206

6 Albertson AM, Reicks M, Joshi N, Gugger CK. Whole grain consumption trends and associations with body weight measures in the United States: results from the cross sectional National Health and Nutrition Examination Survey 2001–2012. Nutrition Journal. 2016;15(1):8. doi:10.1186/s12937-016-0126-4

7 Maki KC, Palacios OM, Koecher K, et al. The relationship between whole grain intake and body weight: results of meta-analyses of observational studies and randomized controlled trials. Nutrients. 2019;11(6):1245. doi:10.3390/nu11061245

8 Wu WC, Inui A, Chen CY. Weight loss induced by whole grain-rich diet is through a gut microbiota-independent mechanism. World J Diabetes. 2020;11(2):26–32. doi:10.4239/wjd.v11.i2.26

9 Gill, S., Rossi, M., Bajka, B., & Whelan, K. (2020). Dietary fibre in gastrointestinal health and disease. *Nature Reviews Gastroenterology & Hepatology*, 18(2), 101–116. https://doi.org/10.1038/s41575-020-00375-4

10 Gibson, G. R., Hutkins, R. W., Sanders, M. E., Prescott, S. L., Reimer, R. A., Salminen, S., Scott, K. P., Stanton, C., Swanson, K. S., Cani, P. D., Verbeke, K., & Reid, G. (2017). Expert consensus document: The International Scientific Association for Probiotics and Prebiotics (ISAPP) consensus statement on the definition and scope of prebiotics.

The European Food Safety Authority (EFSA) recommends 25 grams of fibre per day for normal bowel function and data[1] indicate higher intakes could confer even greater benefits to protect against cardiovascular diseases, type 2 diabetes, and colorectal and breast cancers. Yet fibre intake by Europeans are generally falling short: the average daily intake for adult males range from 18 to 24 grams and for females 16 to 20 grams with little variation among countries.

Nutrition and health claims

According to EFSA, a food or drink product can be referred to as a "source of fibre" or "containing fibre" provided it contains at least 3 grams per 100 grams or 1.5 grams per 100 kilocalories of fibre. The product can be labelled as "high in fibre" or "containing a large amount of fibre" if it contains at least 6 grams per 100 grams or 3 grams per 100 kilocalories of fibre. EU Regulation 1169/2011 states that the amount of dietary fibre can be declared on pre-packed foods.

EU Regulation 1924/2006 lays down rules for nutrition and health claims made on food products and related promotional material. Several health claims for individual fibre components have been approved to help consumers understand the benefits of consuming foods containing specific types of fibre in a significant amount. For example, "rye fibre contributes to normal bowel function" and "inulin [a prebiotic fibre derived from chicory] improves bowel function."

Dietary guidelines in many EU Member States promote fibre intake through the consumption of whole grains, fruits, vegetables, and legumes. For the first time, the Nordic Nutrition Recommendations 2023 call for at least 90 grams of whole grains per day. Policies also target increased consumption of fruit and vegetables and whole grain foods. For example, 15 EU countries have fibre intake in their school food policy standards.

Fortifying products

Fibre content can be increased in food products with three types of fibre: naturally occurring in plant-based foods, isolated fibre from these foods, and synthetic fibre. Isolated fibre is extracted from plants, such as guar gum, pectin, locust bean gum, psyllium husk, beta-glucan soluble fibre and inulin. Synthetic fibre is

Nature Reviews Gastroenterology & Hepatology, 14(8), 491–502. https://doi.org/10.1038/nrgastro.2017.75

made by chemical or enzymatic methods, such as polydextrose. All three types of fibre can be included in new or existing products to help consumers meet dietary recommendations.

Pasta is well-suited to fibre fortification because it is stable in storage, typically consumed in large quantities, and has a texture that is less impacted by the addition of non-standard ingredients. Other suitable foods for fibre enrichment or fortification include breakfast cereals, baked goods, soups, snacks, and dairy, meat and fruit-based products. For instance, lontar fruit has been used to fortify ice cream,[11] grain flours, and produce powders to fortify chicken meatballs[12] and β-glucan to fortify wheat-rye bread.[13]

In order to maximise fibre content in their products, manufacturers must have reliable and accurate means of measuring fibre for labelling purposes. Fibre should be measured by a method of analysis recommended by the European Commission and/or CODEX Alimentarius.

11 Idayati, E., Bele, A. A., & Sir, R. W. (2019). Akseptabilitas Es Krim dengan Fortifikasi Mesocarp Lontar (Borassus flabeliffer L.) sebagai Antioksidan dan Serat Pangan Alami. *Agritech*. https://doi.org/10.22146/agritech.22951

12 Santhi, D., Kalaikannan, A., & Natarajan, A. (2019). Characteristics and composition of emulsion-based functional low-fat chicken meat balls fortified with dietary fiber sources. *Journal of Food Process Engineering*, *43*(3). https://doi.org/10.1111/jfpe.13333

13 Żakowska-Biemans, S., & Kostyra, E. (2023). Sensory Profile, Consumers' Perception and Liking of Wheat-Rye Bread Fortified with Dietary Fibre. *Applied Sciences*, 13(2), 694. https://doi.org/10.3390/app13020694

Case studies

Whole grain promotion in Denmark, Sweden, and internationally

Denmark has a whole grain campaign that aims to increase the availability and consumption of whole grain products and awareness of their health benefits. The campaign is a public-private partnership between the government, health NGOs, and food producers. It includes reformulation efforts and the possibility to display "choose whole grain first" on products containing more than 6 grams per 100 grams of fibre. The Swedish Food Federation aims to launch a similar project in 2023 in cooperation with the Swedish Bread Institute under the name Fullkorns Främjandet (Whole grain Promotion).

The Whole Grain Initiative by the International Association for Cereal Science and Technology aims to increase consumption of whole grains through a coalition of stakeholders. It has working groups focused on whole grain definitions, economic evaluation of increased whole grain intake, best practices for public-private partnerships and communication, sustainability of whole grains, and related food policies.

Taking 'action on fibre' in the United Kingdom

In the UK, only 9% of adults meet the recommended daily intake of fibre. Average consumption is 19.7 grams – only 66% of the recommendation – and lower income households consume even less fibre. In 2015, the UK government increased its dietary recommendation for fibre from 24 to 30 grams per day, but intakes have not changed and there have been no supporting policies to increase them. To address this public health issue, the UK Food and Drink Federation launched an "Action on Fibre" in 2021. It pledges a range of commitments that its members have taken to make higher fibre diets more appealing, normal and easy for consumers. A total of 21 companies representing 25 major global brands are participating. According to the UK Food & Drink Federation, data from 2021–22 show a 2% increase in fibre content of products from these brands due to new product development and reformulation, resulting in 7.2 billion more servings of fibre to consumers.

Reformulating to increase fibre content of bakery products

Based in Abernathy, Scotland, Tower Bakery has five retail stores, third-party outlets, and local authority contracts. In response to regulatory changes regarding nutritional requirements, the company was keen to increase the fibre content of its white bread rolls.

Research was undertaken to identify and source high-fibre flours that would meet fibre content requirements without changing roll colour. Powdered flours that maintain a light colour upon baking were identified. Their functionality was similar to the wheat flour in the existing formulation, so no processing adjustments were required.

Various flour alternatives and formulations were sampled by the development team. Repeated trials were required to fine-tune the fibre content of the rolls but their appearance was not impacted. Fibre content more than doubled in the final product.

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