

CEEREAL Statement on Vitamin and Mineral Fortification of Breakfast Cereals

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CEEREAL represents the European breakfast cereal and oat milling industry and consists of 12 member companies and 7 national associations from 7 countries. We bring together international brands as well as family-owned businesses of all sizes. Our members provide consumers with enjoyable, safe, nutritious, affordable, and sustainable breakfast cereals, which are valued by all people.

The breakfast cereal industry has a long-standing history of fortification.

Fortification is the practice of adding nutrients, e.g., certain vitamins and minerals, to a food to enhance its nutritional quality, and, ultimately, to deliver a public health benefit.

The fortification of ready-to-eat breakfast cereals is a long-established practice. The first fortified breakfast cereals entered the European market in the late 1930s¹.

CEEREAL members are committed to offering people a diverse range of nutritious breakfast cereals. For example, ready-to-eat breakfast cereals are often fortified with B-vitamins and iron, increasingly so with vitamin D and sometimes with calcium.

In 2023, as much as 65% of breakfast cereals sold by CEEREAL members were fortified, amounting to 10.6 billion fortified breakfast cereal servings sold in the same year across Europe.

Breakfast cereals are recognised for their positive contribution to vitamin and mineral intake.

The regular consumption of breakfast cereal has been associated with diets that are higher in vitamins and minerals for adults, adolescents, and children², and, subsequently, may help reduce the risk of inadequate intakes³.

The positive impact of breakfast cereal consumption on vitamin and mineral intake is consistent across the globe - spanning Europe^{4,5}, the United States⁶, Canada⁷ and Australia⁸.

¹ Personal communication by CEEREAL member companies.

² Williams, P.G. (2014). *The benefits of breakfast cereal consumption: a systematic review of the evidence base*. *Advances in Nutrition* 5, 636S–73S. doi: <https://doi.org/10.3945/an.114.006247>.

³ Priebe, M. G., McMonagle, J. R. (2016). *Effects of Ready-to-Eat-Cereals on Key Nutritional and Health Outcomes: A Systematic Review*. *PLoS One*. 11(10):e0164931. doi: <https://doi.org/10.1371/journal.pone.0164931>.

⁴ Gibson, S. (2003). *Micronutrient intakes, micronutrient status and lipid profiles among young people consuming different amounts of breakfast cereals: further analysis of data from the National Diet and Nutrition Survey of Young People aged 4 to 18 years*. *Public Health Nutrition*. 6(8):815-20. doi: <https://doi.org/10.1079/phn2003493>.

⁵ van den Boom, A., et al. (2006). *The contribution of ready-to-eat cereals to daily nutrient intake and breakfast quality in a Mediterranean setting*. *Journal of the American College of Nutrition*. 25 (2):135–43. doi: <https://doi.org/10.1080/07315724.2006.10719524>.

⁶ Zhu, Y., et al. (2019). *Association between ready-to-eat cereal consumption and nutrient intake, nutritional adequacy, and diet quality in adults in the National Health and Nutrition Examination Survey 2015-2016*. *Nutrients*. 11 (12): 2952. doi: <https://doi.org/10.3390/nu11122952>.

⁷ Barr, S.I., et al. (2014). *Breakfast consumption is positively associated with nutrient adequacy in Canadian children and adolescents*. *British Journal of Nutrition* 112(8):1373-83. doi: <https://doi.org/10.1017/S0007114514002190>.

⁸ Fayet-Moore, F., et al. (2017). *Breakfast and breakfast cereal choice and its impact on nutrient and sugar intakes and anthropometric measures among a nationally representative sample of Australian children and adolescents*. *Nutrients*. 9(10): 1045. doi: <https://doi.org/10.3390/nu9101045>.

Furthermore, the daily consumption of fortified breakfast cereal with milk has shown to increase the intake of specific micronutrients; the intake of which was significantly greater versus unfortified breakfast cereal consumption. This was reflected in significant improvements in a range of biomarkers of micronutrient status among the fortified cereal consumers versus the unfortified group⁹.

A modelling study conducted in the UK¹⁰ has shown that fortification of ready-to-eat breakfast cereals can contribute to improved intake and status of vitamin D. Ready-to-eat-breakfast cereals, being eaten by a large proportion of the UK population, offer a suitable vehicle for vitamin D fortification.

Moreover, the scientific evidence demonstrates the benefits of breakfast cereals in the provision of vitamins and minerals across a range of vulnerable population groups, including for example:

- Children and adolescents: Analysis of the Healthy Lifestyle in Europe by Nutrition in Adolescence (HELENA) study showed a higher intake of calcium, phosphorus, potassium, vitamin B2, B5, B7 and D with increasing frequency of ready-to-eat-cereal consumption¹¹. Whilst national dietary survey data from Ireland shows that breakfast cereals are one of the highest contributing sources of vitamin D (23%), dietary folate equivalents (30%) and iron (28%) amongst Irish children (5-12 years)¹².
- Low-income populations: A study of the materially deprived/low-income population in the UK showed that breakfast cereal consumers had higher intakes of a host of vitamins and minerals relative to non-consumers (thiamin, riboflavin, niacin, biotin, folate, vitamin B6, vitamin B12, calcium, iron and zinc)¹³. Additionally, a recent US study further supports the nutritional benefits of ready-to-eat cereal across all income groups¹⁴.
- Restrictive consumers: Fortified plant-based foods - such as fortified breakfast cereals – may also play a particularly important role in alleviating concerns regarding nutritional adequacy of strict plant-based diets¹⁵ (e.g., vegan diets which completely exclude all forms of animal foods). This may be especially important in helping to meet requirements for nutrients predominately found in animal-derived food sources, e.g., vitamin B12¹⁶. Purposeful fortification in this regard may become more critical in parallel with increasing advocacy of plant-based foods in healthy, sustainable diets.

⁹ Powers, H. J., et al. (2016). *Fortified breakfast cereal consumed daily for 12 wk leads to a significant improvement in micronutrient intake and micronutrient status in adolescent girls: a randomised controlled trial*. *Nutrition Journal*. 15(1):69. doi: <https://doi.org/10.1186/s12937-016-0185-6>.

¹⁰ Calame, W., et al. (2020). *Vitamin D Serum Levels in the UK Population, including a Mathematical Approach to Evaluate the Impact of Vitamin D Fortified Ready-to-Eat Breakfast Cereals: Application of the NDNS Database*. *Nutrients*. 12(6): 1868. doi: <https://doi.org/10.3390/nu12061868>.

¹¹ Michels, N., et al. (2015). *European adolescent ready-to-eat-cereal (RTEC) consumers have a healthier dietary intake and body composition compared with non-RTEC consumers*. *European Journal of Nutrition*. 54(4):653–64. doi: <https://doi.org/10.1007/s00394-014-0805-x>.

¹² Irish Universities Nutrition Alliance (2019). *National Children's Food Survey II. Summary Report on Food and Nutrient Intakes, Body Weight, Physical Activity and Eating Behaviours in Children Aged 5-12 Years in Ireland*. <https://irpcdn.multiscreensite.com/46a7ad27/files/uploaded/The%20National%20Children%27s%20Food%20Survey%20II%20Summary%20Report%20-%20September%202019.pdf>. Accessed on 13 July 2023.

¹³ Holmes, B. A., et al. (2012). *The contribution of breakfast cereals to the nutritional intake of the materially deprived UK population*. *European Journal of Clinical Nutrition*. 66(1):10-7. doi: <https://doi.org/10.1038/ejcn.2011.143>.

¹⁴ Smith, J., et al. (2022). *Associations of ready-to-eat cereal consumption and income with dietary outcomes: results from the National Health and Nutrition Examination Survey 2015–2018*. *Frontiers in Nutrition*. 9:816548. doi: <https://doi.org/10.3389/fnut.2022.816548>.

¹⁵ Neufingerl, N., Eilander, A. (2022). *Nutrient Intake and Status in Adults Consuming Plant-Based Diets Compared to Meat-Eaters: A Systematic Review*. *Nutrients*. 14(1): 29. doi: <https://doi.org/10.3390/nu14010029>.

¹⁶ World Health Organisation. (2021). *Plant-based diets and their impact on health, sustainability and the environment: a review of the evidence: WHO European Office for the Prevention and Control of Noncommunicable Diseases*. Copenhagen: WHO Regional Office for Europe. WHO/EURO:2021-4007-43766-61591.

Removing fortified cereals from the diet may have unintended nutritional consequences.

The removal of nutrient-rich grain-based foods from the diet could lead to unintended nutritional consequences – a hypothesis which is supported within the scientific literature.

For example, a modelling analysis of US data evaluated the impact of removing fortified or enriched refined grain foods (bread, ready-to-eat cereals, and all-grained foods) from the diet. Removal of bread and ready-to-eat cereals led to a higher proportion of adults failing to achieve recommended nutrient intakes. Removal of all grains from the diet further exacerbated this result. Importantly, this study also evaluated the impact of the removal/elimination of grains on riboflavin, thiamin and niacin, for which only a small percentage of US adults fall below the estimated average requirement (EAR) (likely due to current fortification practices), which, similarly, resulted in a higher percentage of the population with intakes below respective EARs¹⁷.

The authors of the abovementioned study caution that calls for the lowering of certain fortified or enriched grain foods in the American diet may be counter intuitive to public health initiatives aiming to improve nutritional adequacy.

A similar sentiment is echoed in an Australian publication which also warns of potential negative consequences arising from the elimination of fortified, grain-based foods, risking to “roll back the documented improvements in nutrient intake and health status resulting from food fortification initiatives”¹⁸.

The setting of harmonised maximum levels for vitamins and minerals is under discussion by regulatory authorities in Europe. It is critical that these elements are taken into account when considering setting maximum levels for vitamins and minerals. Also, it is crucial that any regulation in this field continues permitting the free use of nutrition and health claims relating to micronutrients added to foods as a means to incentivise breakfast cereal fortification and to make sure that consumers are aware of associated positive health outcomes.

Conclusions

Fortification is a well-established and safe practice and an important tool to increase people’s intake of vitamins and minerals, thereby contributing to positive health outcomes, including in vulnerable groups, such as children and adolescents, low-income populations, or those on certain, restrictive diets. By the same token, removing fortified foods from the diet may have unintended nutritional consequences and could impede achieving public health objectives. CEEREAL members are committed to offering people a diverse range of nutritious breakfast cereals, which include fortified options to contribute to public health benefits.

¹⁷ Papanikolaou, Y., Fulgoni, V. L. (2021). *The role of fortified and enriched refined grains in the US dietary pattern: A NHANES 2009–2016 modeling analysis to examine nutrient adequacy*. *Frontiers in Nutrition*. 8:655464. doi: <https://doi.org/10.3389/fnut.2021.655464>.

¹⁸ Estell, M. L., et al. (2022). *Fortification of grain foods and NOVA: the potential for altered nutrient intakes while avoiding ultra-processed foods*. *European Journal of Nutrition* 61:935–45. doi: <https://doi.org/10.1007/s00394-021-02701-1>.