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HEALTH CLAIMS FOR TRADITIONAL FERMENTED FOODS

Abstract

Traditional fermented food products were empirically developed to render perishable edible as well as non-edible raw material into products which have a prolonged lifetime. Moreover, fermentation, via metabolic enzymatic reactions, adds to taste or texture, while it enhances the nutritional value of raw material by producing vitamins and bioactive metabolites, and by ridding foodstuffs of their anti-nutrients. With the increasing evidence that some bacteria, known as probiotics, can be beneficial to human health, interest in fermented foods has recently greatly increased. Nutrition and health claims are labeling packaged food products with the intention of positively influencing consumer perceptions about them. To inform and to protect consumers from misleading information, the European Commission has put in place a legislative framework regulating all nutrition and health-related claims which may be labeling food products. Official approval of a health claim for a food is granted following strict standards, and requires sufficient experimental and clinical evidence for this purpose. Drawing from the progress achieved within the 'PIMENTO' – an ongoing European action aiming at valorising fermented foods – yogurt is employed as a case-study for demonstrating the way in which traditional foods may benefit by obtaining an official claim about their health-promoting properties.

Health-promoting properties and other benefits of fermented foods

Foods[1] that are made via a fermentation process represent a greatly diversified group of foods that have contributed to sustenance and food security throughout human

1 Reference to this study: Antonia Matalas and Anastasia Ntantou: Health claims for traditional fermented foods. In Anikó Báti and Patricia Lysaght (eds.): *Living Eating Habits, Revitalized Foodways and the*

history.[2] Fermented foods were developed by practically every human culture worldwide to render perishable edible and non-edible raw material into food products with a prolonged lifetime. They are defined as foods or beverages produced through controlled microbial growth, and the conversion of food components through enzymatic action. Fermentation adds to taste by producing flavourful bacterial metabolites or texture by breaking down carbohydrates and other components. In many traditional societies, fermentation contributes to food security in times of shortage. As an example, in Indonesia, the residues of groundnut press cake and tapioca are often fermented to produce nutritious foods, namely *tempte-bongrek* and *ontjom* – foods that are important in the daily regimen of the poorest individuals[1] – while *koumiss* had been used as a safe and easy way to transport beverage for nomadic populations of Central Asia, who had to travel very often to places with variations in climatic and environmental conditions. *Kawal*, a fermented product made from the leaves of a wild African legume, is believed to have helped children and adults in Sudan to endure the 1983–1985 famine. In a context in which biodiversity is decreasing worldwide, a body of evidence positively associates dietary diversity with human health.[3] Therefore, there is a critical need to maintain and improve food as a source of diverse beneficial microbiota and nutrients in times when diets are drastically changing towards highly-processed foods. Another urgent challenge is the transition towards more sustainable diets. This transition resonates with the growing consumer demand for natural and healthier products that are available at affordable prices.[4]

In recent years, fermented foods have undergone a surge in popularity, mainly due to their proposed health benefits. Fermented foods can also meet the urgent demands outlined above, owing to their unique properties,[5] which include the presence of live microorganisms and microbial metabolites and bioactive

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2 Tamang, Jyoti P. – Cotter, Paul D. and Endo, Akihito et al.: 'Fermented foods in a global age: East meets West, *Comprehensive Reviews of Food Science and Food Safety* 19/1 (2020), 184–217.

3 Wahlqvist, Mark L.: 'Regional food diversity and human health', *Asia Pacific Journal of Clinical Nutrition* 12/3 (2003), 304–308; Kant, A. K. – Schatzkin, A. and Ziegler, R. G.:'Dietary diversity and subsequent cause-specific mortality in the NHANES I epidemiologic follow-up study', *Journal of the American College of Nutrition* 14/3 (1995), 233–238.

4 Alsubhi, Moosa – Blake, Miranda and Nguyen, Tan et al: 'Consumer willingness to pay for healthier food products: A systematic review', *Obesity Reviews* 24/1 (2023), e13525.

5 Marco, Maria L. – Heeney, Dustin – Binda, Sylvie et al.: 'Health benefits of fermented foods: microbiota and beyond', *Current Opinion Biotechnology* 44 (2017), 94–102.

compounds, as well as the minimal quantities of energy required for their production and preservation. To fully realise their potential, fermented foods must ultimately be integrated into effective public health and sustainability policies.[6] To this end, there is a need for the coordination of the wealth of scientific knowledge on fermented foods emerging from the studies on food ecosystems, food microbiology, as well as on the role of gut microbiota in health and on disease onset.

Compared to other components of the human diet, fermented foods add a unique dimension to the relationship between diet and health because of the fermentative microorganisms and the products of fermentation that they contain, in addition to the various macro- and micronutrients classically studied by nutritionists. Although nutrition science is an interdisciplinary field, published research reports are often characterised by a limitation of scope, resulting in a lack of holistic assessment of the complex array of elements that characterise the interaction of food components with the human body. This fragmented approach to nutrition research makes it difficult to objectively characterise the health properties of diets, foods, or nutrients. The European action PIMENTO, with its third Working Group,[7] aims at evaluating the health-promoting potential of fermented foods while adopting an interdisciplinary approach to its work.

Legislative framework for health claims

A pragmatic, yet an innovative approach for the academic sector in order to tackle the health properties of diets, is to use the regulatory framework of the European Commission that regulates nutrition and health-related claims which appear on the labels of food products, in order to inform and to protect consumers from misleading information.[8] The relevant 'European Food Safety Authority' (EFSA) guidelines for

6 Mukherjee, Arghya – Gómez-Sala, Beatrix and O'Connor, Eibhlís M. et al.: 'Global Regulatory Frameworks for Fermented Foods: A Review', *Frontiers Nutrition* 9 (2022), 902642; Farnworth Edward R.: 'The evidence to support health claims for probiotics', *Journal of Nutrition* 138 (2008), 1250S-4S.

7 PIMENTO is a European Union funded scientific network for the promotion of fermented foods. Information on its aims, participants, and results, are available in its website: https://fermentedfoods.eu/.

8 Nutrition and health-claims for packaged foods are regulated by the European Parliament and European Council regulation nº 1924/2006; see: Turck, Dominique – Bresson, Jean-Louis and Burlingame, Barbara et al. : 'Scientific and technical guidance for the preparation and presentation of a health claim application (Revision 2)', *EFSA Journal* 15 (2017), e04680; EFSA (2021) 'General scientific guidance for stakeholders on health claim applications (Revision 1)', *EFSA Journal* 19/3 (2021), e06553.

the preparation and presentation of a health claim, require not only that the results of human studies are systematically reported and evaluated, but also that this information is complemented by an assessment of the properties of a food or ingredient for which the effect is claimed. This characterisation comprises information on the composition and stability of the active compounds in the food in question. Furthermore, EFSA requires additional data on the mechanism of action to be provided, derived from studies conducted *in vitro* or in animal models, while the experimental evidence required to support health claims also includes data derived from clinical interventions in humans. Thus, the authorisation process for a health claim is both a long and a costly one.

The first qualified health claim to be made by a conventional food was in 2008; the US Food and Drug Administration (FDA) gave permission for packed peanuts, almonds, hazelnuts, pecans, pistachios and walnuts to carry a label touting their heart-healthy effects, that reads: 'Scientific evidence suggests but does not prove that eating 1.5 ounces of most nuts (a small handful), as part of a diet low in saturated fat and cholesterol, may reduce the risk of heart disease.' In Europe, the relevant regulatory framework was put in place in 2006; notably, the first products for which applications were submitted for a health claim, were novel foods in which microorganisms that qualify as probiotics had been added. However, as of 2025, no probiotic food product is sold in the European Union that carries a label health claim, although there are quite a few probiotic bacteria which are generally accepted as safe. The public debate over the reluctance of EFSA to authorise health claims for probiotics is exemplified by a series of articles in the mass media and in the popular press (Fig. 1). In this respect, there are discrepancies across different countries in implementing the principles of food safety with respect to foods that contain probiotics. More notably, the health regulatory agency of Japan has approved health claims for over 20 probiotic products in accordance with the Japanese 'Foods for Specific Health Use' system, implementing a more lenient regulatory framework.[9]

Health claims for fermented milks

Among the various fermented foods, fermented dairy products constitute the group whose microbiological constituents and impact on health are better understood.

9 Farnworth, Edward R.: 'The evidence to support health claims for probiotics', *Journal of Nutrition* (2008), 138, 1250S-4S.

Many fermented milks contain live cultures of bacteria; as the health benefits of ingested live bacteria have become evident, these products seek a way of obtaining an authorised health-claim label. Thus, several health claims have been put forward by interested parties for products such as yogurt, kefir and buttermilk. Nevertheless, securing official approval for a new health claim can be arduous. Approval of a nutrition or a health claim for a dairy product, following the strictly-regulated framework described above, limits the potential for foods that are made via an artisanal process, such as traditional dairy products, to present the evidence needed. In the EU and in the United States of America (USA), two different health claims have been substantiated for fermented milks, concerning their beneficial effects on gastrointestinal health on the one hand, and on metabolic health, on the other. These are presented in detail in the following paragraphs.

Fermented products positively modulate gastrointestinal health through diverse mechanisms, including the potential probiotic effect of their constituent microbes, reduction of antinutrients in foodstuffs, and bioactivity of bioactive compounds produced during fermentation.[10] It is notable that several probiotic microbes, which are often closely related to those found in fermented dairy products, have been shown to be beneficial in the management of gastrointestinal symptoms in different populations, such as pregnant women, athletes, and patients with irritable bowel syndrome and neurodegenerative disorders.[11] Based on the findings of fourteen clinical intervention studies, and guided by the 'Guidance on the scientific requirements for health claims related to the immune system, the gastrointestinal tract and defence against pathogenic microorganisms', EFSA considered a health claim for the alleviation of gastrointestinal discomfort related to lactose intolerance by live cultures in yogurt and yoghurt-like fermented milks. Based on the scientific evidence presented, the experts panel concluded that 'live yoghurt cultures' are sufficiently characterised in relation to the claimed effect, and EFSA proposed the following wording to best reflect the scientific evidence: 'Live yoghurt cultures in yoghurt improve digestion of lactose in yoghurt in individuals with lactose maldigestion.'[12] To support the claim, the yoghurt should contain at least a minimum

10 Dimidi, Eirini – Cox, Selina R. and Rossi, Megan et al.: 'Fermented Foods: Definitions and Characteristics, Impact on the Gut Microbiota and Effects on Gastrointestinal Health and Disease', *Nutrients* 11/8 (2019), 1806–1814.

11 Hungin, A.P.S. – Mitchell, C.R. and Whorwell, P. et al.: 'Systematic review: probiotics in the management of lower gastrointestinal symptoms – an updated evidence-based international consensus', *Aliment Pharmacological Therapy* 47/8 (2018), 1054–1070.

12 EFSA Panel on Dietetic Products, Nutrition and Allergies (2010). 'Scientific Opinion on the substantiation of health claims related to live yoghurt cultures and improved lactose digestion

amount of live starter microorganisms in question (10^8 CFU from the species Lactobacillus delbrueckii subsp. bulgaricus and Streptococcus thermophilus per gram[13]). The claim is intended to assist individuals with lactose maldigestion. Although there is growing evidence about the impact of fermented dairy consumption on gastrointestinal issues in healthy adults, so far, no official approval has been granted to statements about causal relationships with digestive discomforts other than the one related to lactose intolerance.

The second health claim for yogurt which was recently approved in the USA relates to Type II diabetes. Type II diabetes is one of the major diseases among metabolic disorders; its prevalence is rising worldwide, and it represents a significant burden for the public health system.[14] Several studies have examined the effect of specific fermented milks on parameters of diabetes, such as glycaemia and insulin resistance. In this context, the aim of a systematic review of the effects of the consumption of different fermented foods on glucose homeostasis in healthy populations, was to assess whether the regular consumption of fermented foods has a positive impact on Type II diabetes in healthy adults without the need to use medication, and the FDA concluded that: 'Eating yogurt regularly, at least 2 cups (3 servings) per week, may reduce the risk of Type 2 diabetes according to limited scientific evidence.'[15]

Another area in which fermented milks have received attention deserves to be mentioned, namely, the immunity of the human body. The term immunity refers to safeguarding against pathogenic diseases through the prevention of dysbiosis. The composition of the community of microbial residents influences a balanced immune response of the human organism. As this is true for every part of the human body, it also holds true for the female genital system. Bacterial vaginosis and vulvovaginal candidiasis are common pathogenic conditions for women that cause discomfort and interfere with everyday activities, while they also result in increased susceptibility to other infections or risk of obstetric complications.[16] Both conditions arise when

(ID 1143, 2976) pursuant to Article 13(1) of Regulation (EC) No 1924/2006', *EFSA Journal* 8 (2010), 1763–1780.

13 CFU: Colony forming unit.

14 Ogurtsova, Katherine – Guariguata, Leonor and Barengo, Nöel C. et al.: 'IDF diabetes Atlas: Global estimates of undiagnosed diabetes in adults for 2021', *Diabetes Research Clinical Practice* 183 (2022), 109–118.

15 FDA (2024). 'FDA Announces Qualified Health Claim for Yogurt and Reduced Risk of Type 2 Diabetes' <https://www.fda.gov/food/hfp-constituent-updates/fda-announces-qualified-health-claim-yogurt-and-reduced-risk-type-2-diabetes> accessed 22 January 2025.

16 Todorovic, Smilja et al.: 'Health benefits and risks of fermented foods – the PIMENTO initiative. *Frontiers Nutrition* 11 (2024), 1458536.

the natural microflora is disturbed; increasing the proportion of *Lactobacilli*, and decreasing the proportion of potentially pathogenic bacteria or yeasts in the vagina, become the targets for prevention and treatment of both conditions. Clinical studies have demonstrated the efficacy of oral administration of certain probiotics, while a few suggest the beneficial effects of the consumption of fermented foods for the prevention and treatment of vaginitis. However, clinical sciences and food sciences take a distinct approach to the use of bacteria, with the former focusing on efficacy studies involving probiotic strains as supplements, and the latter employing the same strains as culture organisms to ferment food matrices. The PIMENTO work-team is currently addressing this gap in knowledge by compiling and evaluating meaningful clinical data on the way in which consumption of fermented milks can contribute to the prevention and treatment of vaginitis. The outcome of this systematic review could create the basis for the substantiation of a new health claim for yogurt and other fermented milks.

Concluding remarks

Health claims are used on the labels of packaged food products with the intention of positively influencing consumer perceptions about these foods. However, as consumers must be protected from false claims about the properties of various foodstuffs, the substantiation of health claims destined to be used by food products is a challenging and sensitive issue. In this context, EFSA in the EU, is tasked with providing expert analysis and scientific evaluation of risks, as well as information, to all interested sectors and to the public in general.

Present in all diets, fermented foods hold a strategic place due to the benefits they offer in terms of sustenance, cultural heritage, innovation, sustainability, and consumer interest. Fermented foods differ in many ways from mass-produced foods currently consumed in modern societies; due to the fermentation process they have unique sensorial properties and enhanced nutritional value. The scientific literature suggests that consuming foods like koumiss, kimchi, sauerkraut, and tempeh, may positively affect health, including leading to improvements in triglycerides and cholesterol levels, an increase in high-density lipoprotein cholesterol, improvement blood glucose control, and improvement in overall well-being. Milk-based fermented drinks – apart from being a good source of milk, deprived of its lactose content –

also contain bioactive compounds and often, live cultures.[17] However, despite the importance of the various traditional fermented products produced in sustaining people around the world, their health-promoting properties, associated with their consumption, are not yet well studied.

From the above it becomes evident that the potential of fermented foods as part of modern diets is highly relevant. As traditional fermented foods are often of an artisanal nature and thus at risk of disappearing, together with the diversity of native microorganisms used in their production, due to urbanisation and changing food habits, their valorisation by national and international organisations would represent a meaningful future policy.

List of References

Printed

Baschali, Aristea – Tsakalidou, Effie – Kyriacou, Adamantini – Karavasiloglou, Nena and Matalas, Antonia-Leda : 'Traditional low-alcoholic and non-alcoholic fermented beverages consumed in European countries: A neglected food group'. *Nutrition Research Reviews,* 30. 2017. 1–24.

Dimidi, Eirini – Cox, Selina R. and Rossi, Megan et al.: 'Fermented Foods: Definitions and Characteristics, Impact on the Gut Microbiota and Effects on Gastrointestinal Health and Disease'. *Nutrients,* 11/8. 2019. 1806–1814.

Hungin, A.P.S. – Mitchell, C.R. and Whorwell, P. et al.: 'Systematic review: probiotics in the management of lower gastrointestinal symptoms – an updated evidence-based international consensus'. *Aliment Pharmacological Therapy,* 47/8. 2018. 1054–1070.

Kant, A. K. – Schatzkin, A. and Ziegler, R. G.: 'Dietary diversity and subsequent cause-specific mortality in the NHANES I epidemiologic follow-up study'. *Journal of the American College of Nutrition,* 14/3. 1995. 233–238.

Marco, Maria L. – Heeney, Dustin – Binda, Sylvie et al.: 'Health benefits of fermented foods: microbiota and beyond'. *Current Opinion Biotechnology,* 44. 2017. 94–102.

Ogurtsova, Katherine – Guariguata, Leonor and Barengo, Noël C. et al.: 'IDF diabetes Atlas: Global estimates of undiagnosed diabetes in adults for 2021'. *Diabetes Research Clinical Practice,* 183. 2022. 109–118.

Tamang, Jyoti P. – Cotter, Paul D. and Endo, Akihito et al.: 'Fermented foods in a global age: East meets West. *Comprehensive Reviews of Food Science and Food Safety,* 19/1. 2020. 184–217.

17 Baschali, Aristea – Tsakalidou, Effie – Kyriacou, Adamantini – Karavasiloglou, Nena and Matalas, Antonia-Leda: 'Traditional low-alcoholic and non-alcoholic fermented beverages consumed in European countries: A neglected food group', *Nutrition Research Reviews* 30 (2017), 1–24.

Wahlqvist, Mark L.: 'Regional food diversity and human health'. *Asia Pacific Journal of Clinical Nutrition,* 12/3. 2003. 304–308.

Internet

Alsubhi, Moosa – Blake, Miranda and Nguyen, Tan et al.: 'Consumer willingness to pay for healthier food products: A systematic review'. *Obesity Reviews,* 24/1. 2023. e13525. <https://doi.org/10.1111/obr.13525> accessed 28 April 2025.

EFSA (2021) 'General scientific guidance for stakeholders on health claim applications (Revision 1)'. *EFSA Journal,* 19/3. 2021. e06553. <https://doi.org/10.2903/j.efsa.2021.6553> accessed 28 April 2025.

Farnworth Edward R.: 'The evidence to support health claims for probiotics'. *Journal of Nutrition,* 138. 2008. 1250S-4S. <https://doi.org/10.1093/jn/138.6.1250S> accessed 28 April 2025.

FDA (2024). 'FDA Announces Qualified Health Claim for Yogurt and Reduced Risk of Type 2 Diabetes' <https://www.fda.gov/food/hfp-constituent-updates/fda-announces-qualified-health-claim-yogurt-and-reduced-risk-type-2-diabetes> accessed 22 January 2025.

Mukherjee, Arghya – Gómez-Sala, Beatrix and O'Connor, Eibhlís M. et al.: 'Global Regulatory Frameworks for Fermented Foods: A Review'. *Frontiers Nutrition,* 9. 2022. 902642 <https://doi.org/10.3389/fnut.2022.902642> accessed 28 April 2025.

PIMENTO https://fermentedfoods.eu/.accessed 28 April 2025.

Turck, Dominique – Bresson, Jean-Louis and Burlingame, Barbara et al. : 'Scientific and technical guidance for the preparation and presentation of a health claim application (Revision 2)'. *EFSA Journal*, 15. 2017.e04680 <https://doi.org/10.2903/j.efsa.2017.4779> accessed 28 April 2025.

'Scientific Opinion on the substantiation of health claims related to live yoghurt cultures and improved lactose digestion (ID 1143, 2976) pursuant to Article 13(1) of Regulation (EC) No 1924/2006', *EFSA Journal,* 8. 2010. 1763–1780. <https://doi.org/10.2903/j.efsa.2010.1763>accessed 28 April 2025.

Todorovic, Smilja et al.: 'Health benefits and risks of fermented foods – the PIMENTO initiative. *Frontiers Nutrition,* 11. 2024. 1458536. <https://doi.org/10.3389/fnut.2024.1458536>accessed 28 April 2025.