

OVERVIEW

Oats are gaining recognition as a powerhouse ingredient with wide-ranging benefits for gastrointestinal health and overall well-being.

Rich in bioactive compounds such as beta-glucans and antioxidants, oats offer prebiotic, anti-inflammatory, and digestive-supportive properties. Beyond aiding digestion, improved gut health is increasingly linked to broader health outcomes, including enhanced immunity, reduced inflammation, and even mental well-being, positioning oats as a versatile ingredient in functional food development.

As consumer interest in gut health continues to grow, the importance of basing R&D on trustworthy, peer-reviewed science cannot be overstated. Rigorous research ensures product efficacy, strengthens consumer confidence, and supports the development of solutions that address both specific health concerns and broader wellness trends.

This executive summary synthesises the latest research indexed in the Food Science and Technology Abstracts (FSTA) database, highlighting cutting-edge studies on the functional properties of oats. By exploring their potential applications across health-focused product categories, this report provides actionable insights for R&D teams aiming to innovate in this rapidly expanding field.



OATS AND BETA-GLUCAN IN HEALTH CONDITIONS

Oats, and the bioactive compounds contained within them, can play a role in managing specific health conditions. Research supports the use of oats as part of dietary strategies for improving health outcomes, from cancer prevention to managing metabolic disorders.

Metabolic Regulation in Colorectal Cancer

Recent studies have highlighted the role of low-molar-mass oat beta-glucans in regulating metabolic processes during the early stages of colorectal cancer. In animal models, beta-glucans from oats have been shown to reduce inflammation, improve antioxidant potential, and alter the colonic metabolomic profile, which could help slow cancer progression. Additionally, oat beta-glucans enhanced the antioxidant potential, contributing to a reduction in oxidative stress, which is a critical factor in the early stages of carcinogenesis. Metabolomic studies confirmed that beta-glucans influenced metabolic pathways, including amino acid and purine metabolism, highlighting their multifaceted role in modulating colonic health during cancer development.

Dyslipidemia and Cardiovascular Health

Oats have long been recognised for their beneficial effects on cholesterol management. Consuming oat-based products, especially those rich in beta-glucan, has been shown to reduce total cholesterol and LDL cholesterol, making oats a key ingredient in heart-health strategies. This supports their inclusion in products aimed at individuals with dyslipidemia or those at risk of cardiovascular disease, providing a natural dietary tool for lowering cholesterol levels.

Food Allergies and Gut Health

Oat beta-glucan's potential to alleviate food allergy symptoms and improve gut health has been explored in various studies. By promoting beneficial gut bacteria and enhancing gut barrier function, oat beta-glucan plays an immunomodulatory role, particularly for those with food allergies or gut-related inflammation. This provides a therapeutic avenue for managing symptoms of food allergies and supporting overall gut health.





Immune Modulation and Inflammation

Oats have been shown to modulate immune responses and reduce inflammation, particularly in metabolically at-risk populations. Studies have demonstrated significant reductions in inflammatory markers, such as CRP and TNF- α , in individuals with conditions like metabolic syndrome and hypercholesterolemia. The anti-inflammatory effects of oats are more pronounced in long-term supplementation, highlighting their potential in managing chronic inflammatory diseases.

OATS AND BETA-GLUCAN IN WELLNESS PROMOTION

Oats are also widely recognised for their role in supporting general health and wellness, particularly in the context of functional foods. Their versatility as a food ingredient allows for a wide range of applications aimed at promoting ongoing health rather than treating specific diseases.

Oats in Functional Foods

Oats, particularly beta-glucan, are a key functional ingredient used in a variety of products designed to support overall health. From breakfast cereals and snacks to beverages and dairy products, oats offer a simple and natural way to incorporate health benefits into daily diets. Their mild flavour and rich fibre content make them an attractive choice for food manufacturers aiming to create health-oriented foods.

Gut Health and Digestive Health Products

Oat beta-glucan has been proven to have beneficial effects on gut health by promoting the growth of beneficial bacteria and improving gut barrier function. These benefits make oats an excellent ingredient in digestive health products, such as probiotic foods, fermented products, and functional beverages. By enhancing the production of short-chain fatty acids like butyrate, oats contribute to better gut health and reduced inflammation, supporting the growing market for digestive health products.

Cardiovascular Health and Cholesterol-Lowering Foods

Oats continue to be a staple in cardiovascular health products due to their ability to lower cholesterol levels. The soluble fibre in oats, particularly beta-glucan, helps reduce total cholesterol and LDL cholesterol, which is beneficial for heart health. As part of cholesterol-lowering products, oats provide an accessible way for consumers to manage their cholesterol levels and support cardiovascular wellness.

Immune Function and Inflammation Modulation

The immune-boosting properties of oats are increasingly recognised in wellness products. Oats' beta-glucan has been shown to stimulate the immune system and help reduce inflammation, supporting overall immune health. This makes oats an attractive ingredient for products aimed at improving immune function, including fortified beverages, immune supplements, and snacks. As global health concerns drive demand for immune support, oats fit well within the wellness-focused food market.

Oats and Exercise Adaptability

Oats, especially oat bran, are being explored for their role in improving athletic performance and exercise adaptability. Studies have shown that oats can influence oxidative stress, energy homeostasis, and muscle function. Their impact on oxidative stress and the ability to support energy balance make oats a valuable ingredient for products designed for athletes or active individuals. Incorporating oats into sports nutrition products could help enhance exercise performance and recovery.



Diverse health benefits present a compelling innovation opportunity for oat manufacturers to develop value-added products that cater to both therapeutic and wellness markets. By addressing specific health goals such as cardiovascular health, gut health, immune function, and metabolic regulation, oat-based ingredients can be integrated into functional foods and beverages targeting disease management and preventive nutrition, while rising consumer demand for natural, health-promoting ingredients, afford the opportunity to develop tailored solutions in the rapidly growing market for functional and therapeutic foods.

DEEP DIVE: BIOACTIVE COMPOUNDS & INGREDIENTS DRIVING FUNCTIONAL FOOD INNOVATION

Recent studies have identified several bioactive compounds derived from oats and other cereals that hold significant potential for improving human health. These compounds, including β -glucan, flavonoids, phenolic acids, and proteins, can be utilised to develop functional foods with specific health benefits.

OAT B-GLUCAN

β -glucan is a soluble dietary fibre predominantly found in oats and barley, known for its cholesterol-lowering and immune-modulating properties. It has been shown to alleviate insulin resistance in high-fat diet-induced models by restoring circadian clock rhythms and improving gut microbiome health. β -glucan also promotes gastrointestinal health by activating short-chain fatty acids (SCFAs), which enhance the secretion of glucagon-like peptide (GLP-1). Moreover, the potential to fortify foods with β -glucan has made it a key player in functional food development, especially in regulating metabolic disorders. A recent review of β -glucan's structure and bioavailability highlights its importance in health, noting its growing global trade and industrial utilization, especially in food, pharmaceuticals, and cosmetics.

OAT PROTEIN ISOLATE (OPI) AND HIGH METHOXYL PECTIN (HMP) COMPLEXES

The development of Pickering emulsions stabilised by oat protein isolate (OPI) and high methoxyl pectin (HMP) complexes has opened new avenues for nutraceutical delivery systems. Smaller particle sizes of OPI/HMP complexes (ranging from 125.7-297.6 nm) have been found to enhance the stability and encapsulation efficiency of emulsions, which can improve the bioaccessibility of bioactive compounds like curcumin. These emulsions not only stabilize bioactive compounds but also allow for controlled release in the gastrointestinal tract, showing great promise in enhancing the bioavailability of functional ingredients in foods and beverages.



OAT HUSKS AND FLOURS

Oat husks, especially from dark-coloured oat varieties, are rich in dietary fibre, phenolic acids, and flavonoids. These compounds demonstrate antioxidant and antimicrobial activities, with high concentrations of ferulic acid and other phenolic compounds. Studies have shown that oat husk extracts exhibit bactericidal properties, making them a potential ingredient in functional foods aimed at gut health. Moreover, oat flour is high in protein, fat, and β -glucan content, offering both nutritional benefits and bioactive properties that support cardiovascular health and gastrointestinal function.

FLAVONOIDS AND POLYPHENOLS IN CEREAL-BASED DIETS

A range of bioactive compounds, including rutin, quercetin, and polyphenols, have been identified in cereals such as oats and buckwheat. These compounds are associated with antioxidative properties that can enhance health outcomes, particularly in young athletes. A dietary fibre mixing powder containing these bioactive compounds has shown improved free radical clearance under gastrointestinal conditions, highlighting their potential in functional food applications. Moreover, the use of these bioactive compounds may support the development of functional foods targeting inflammation, metabolic disorders, and immune health.

RIBOFLAVIN AND PREBIOTICS IN FERMENTED OAT-BASED BEVERAGES

The fermentation of oat-based beverages using strains of *Weissella cibaria* has been shown to enrich the beverages with riboflavin (vitamin B2), dextran, and prebiotic oligosaccharides like panose. The unique capabilities of this strain provide a means to biofortify plant-based drinks, improving their nutritional and rheological properties. These beverages can serve as a functional food option for consumers, particularly those seeking plant-based sources of essential nutrients like riboflavin. Furthermore, the strain's probiotic properties, including high survival rates under gastrointestinal conditions, offer additional health benefits, particularly in gut health.

The bioactive compounds and ingredients derived from oats, including β -glucan, proteins, flavonoids, and phenolic acids, offer significant potential for the development of functional foods targeting a range of health benefits. Their applications in enhancing bioavailability, gut health, metabolic disorders, and immune function position oats and their derivatives as valuable ingredients in the functional food and nutraceutical industries. Future research and innovation in processing and delivery systems will likely expand their use, creating new opportunities for health-promoting foods.

UNLOCKING FURTHER INSIGHTS INTO FUNCTIONAL FOODS AND GUT HEALTH

For a deeper understanding of scientific advancements in functional foods, gut health, and food science, explore the FSTA database. An expertly curated resource from the International Food Information Service, FSTA compiles scientific data from 91 countries in 43 languages, including patents and continuously updated publications. Every entry undergoes rigorous vetting, ensuring quick access to high-quality, relevant information.

With FSTA, you can make data-driven decisions for innovative food development. From initial research to final formulation, FSTA stands as a globally trusted resource for the food science community.



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