



Fortified kernels

Making rice more nutritious

Why make rice more nutritious?

Rice is eaten by over half of the global population, making it the world's number one staple food. It is consumed in many developing countries, where deficiencies in essential vitamins and minerals, also called micronutrients, are known to be high.

Rice is a good source of energy and a natural source of vitamins and minerals, but neither milled white nor brown rice provide a significant quantity of micronutrients compared to the daily recommended intakes. In addition, the milling process removes both the fat and nutrient-rich bran layers, which produces the commonly consumed and starch-rich white rice.

Following the harvesting and milling process, fortifying rice with vital micronutrients is an effective solution for addressing deficiencies and improving the micronutrient status of the millions of people for whom rice is the main staple food. It also offers a huge opportunity to differentiate rice brands by addressing the specific needs of consumers, such as high fiber or increased protein content.

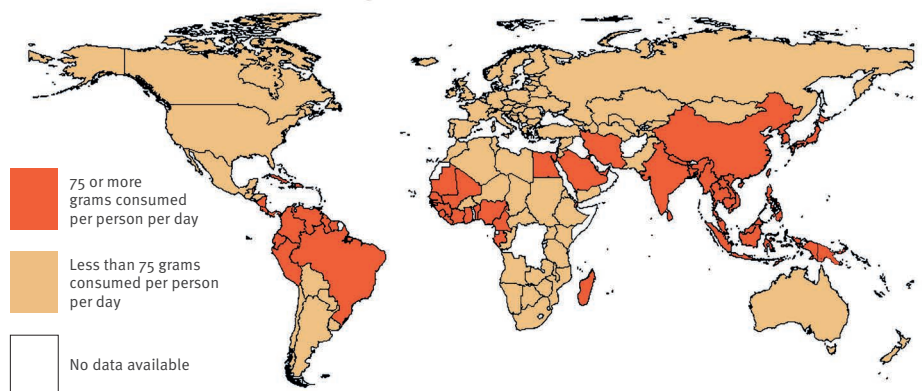
Success story: Fortified rice brands

Increasing numbers of fortified rice products are being launched in response to specific consumer demands. In addition to boosting nutrition in general, solutions offering specific benefits such as improved energy or immunity are also being developed by adding fortified kernels.

Success story: Fortified rice in Costa Rica^{3,4,5,6,7}

In Costa Rica, per capita rice consumption is approximately 150 g per day on average, providing around 30% of caloric intake. All rice for human consumption in Costa Rica is fortified with folic acid, vitamins B₁, B₃, B₁₂, E, selenium and zinc. Since the introduction of the food fortification program, which includes rice, the prevalence of anemia in the country has drastically decreased, with a 71.2% reduction among children aged one to six years.

World map of rice consumption^{1,2}

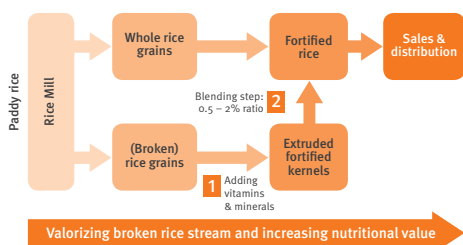


How do we improve the nutritional value of rice?

DSM has been a pioneer in the development of hot extrusion fortification technology for rice fortification. This robust and cost-effective method of adding vitamins and minerals to rice also allows for other nutrients to be included, such as fibers or amino acids, to enhance the overall nutritional value of the product.

Nutrients can be added to rice in a straightforward two-step process:

1. Broken rice grains are ground into rice flour and mixed with water and vitamins, minerals and/or other nutrients to produce a rice dough.
2. This fortified rice dough is passed through an extruder to produce the fortified kernels, which are then blended with rice, typically in a ratio of 0.5-2%, to produce the final product.



Benefits of extruded fortified kernels⁸

DSM's fortified kernels produced by hot extrusion provide a multitude of benefits:

Robustness

The added high-quality micronutrients are embedded in the rice matrix and remain so even if the rice is washed before cooking, steamed, or cooked in excess water.

Acceptance

As the appearance and taste of the fortified kernels are similar to that of non-fortified rice, consumers can increase their nutritional intake without their dietary or food preparation habits being affected.

Flexibility

Any variety of rice can be fortified. The shape, size and color of fortified kernels can be customized to create food products with widespread appeal. Additionally, the blend of micronutrients can be modified to meet the specific needs of target populations, such as the elderly or vulnerable groups, or to address specific health concerns, such as immunity or brain health.

Scientific backing

The use of hot extrusion technology to produce fortified kernels is supported globally by a wide range of evidence on acceptability and effectiveness in improving micronutrient status.

Market opportunities

Fortified kernels offer a wealth of commercial opportunities. Over 30% of industrially milled wheat flour and almost half of industrially milled maize flour is fortified globally, compared to just 1% of rice, where efforts to fortify at scale have only recently started. This percentage is expected to rise substantially in the coming years for a number of reasons, including:

- Advancements in the technology that enable cost-effective rice fortification
- A growing evidence base of the benefits of fortifying rice
- An increase in the support from governments and non-governmental organizations (NGOs), including UN agencies

Rice fortification is mandatory in five countries and six US states, with similar legislation being considered in several other countries around the world.

Rice brand owners are also using fortification as a method of differentiating their products by providing healthier, more nutritious rice that meets consumer needs. The rice market is constantly evolving and the popularity of rice makes it effective in bringing crucial micronutrients to consumers that can address specific demands, including energy levels, immunity and more. This offers brands the opportunity to strengthen their position in the market with unique, targeted products through cost-effective fortification.

Contact us

DSM offers a broad portfolio of high quality and safe fortified rice kernels, produced with Fortitech[®] Premixes, its premier customer nutrient premix service. Combined with its in-depth consumer insights, market knowledge, application and marketing expertise, DSM can help you get to market faster with rice solutions that take you further. Contact us to find out more: Nutrition.improvement@dsm.com.



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References available upon request

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