

**RICE** bran refers to the outer bran and germ of the white rice kernel and is a by-product of rice milling. Until a few years ago, rice bran was considered a waste product with little value because of lipid instability. However, the introduction of innovative lipid stabilisation technology has allowed rice bran to move up into a higher hierarchy of the food chain.

As a matter of fact, there is great similarity in the journey of rice bran and dairy whey. Both protein sources were considered worthless residues with very little or no value added applications. In just 50 years, dairy whey has transited into a very valuable source of protein that often is dubbed 'the new white gold'.

Besides, premium protein whey also hosts bioactive

compounds very much the same way the bioactive micro-ingredients of rice bran protein are now being unravelled. Hence, it is expected that rice bran protein will potentially follow the same journey, as the world urgently needs to source ingredients that can build value throughout the entire food chain.

Rice bran can further be nutritionally protein-enhanced by adding in a series of processing steps, a protease enzyme to a slurry, followed by thermal treatment to activate the protease enzyme to create a rice protein fraction ranging from 35 percent concentrate, all the way to a true 90 percent isolate.

Rice bran protein hydrolysate is synonymous with great tasting whole grain nutrition. Rice bran is a high source of protein, oil,

carbohydrate, synbiotic fibre with a number of micronutrients like vitamins, minerals, anti-oxidants and phytosterols. To turn rice bran into a functional food ingredient or dietary supplement, it is essential to stabilise the bran: the lipid hydrolysing and oxidising enzymes present in the bran must be inactivated to prevent interaction of these enzymes, especially lipase and peroxidase in the oil fraction.

This deactivation will prevent hydrolytic and oxidative rancidity that cause the development of objectionable odours and flavours. Once successfully stabilised, the rice bran can serve not only as a main dietary nutrient throughout the food chain but also as a functional all-natural ingredient in formulated beverages, food and meat products, along with structured extruded components for (hybrid) meat, meat-free,

## Rice Bran: The **Next White** **GOLD**

With its plethora of benefits, rice bran is taking a leaf from whey protein in becoming a valuable ingredient from a waste by-product. In the first of a two-part series, the properties of rice bran will be addressed.

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and hypoallergenic (gluten-free) bakery products. In particular, rice milk will emerge as a major contender to challenge the hegemony of soymilk.

The main commercial name of stabilised rice bran is RiBran, manufactured by RiceBran Technologies. This portfolio of ingredients offers an entirely new category of natural, healthy, and multifunctional products that help manufacturers to formulate healthier foods. Essentially, rice bran is a unique ingredient composed of a complex matrix of insoluble fibre, soluble fibre, non-allergen (hypoallergenic) high quality protein and trans fat free healthy oils.

As such, the ingredient can be used without the concerns of spoilage and loss of heat-sensitive nutrients, including maintenance of high levels of phytosterols, gamma oryzanol, tocopherols and tocotrienols. The unique combinations of rice protein, rice fibre, and rice oil with over 100 antioxidants and co-factors

deliver long-term energy burn. In addition, clinical studies have shown it to aid in cholesterol and blood sugar management.

A special mention goes to rice lecithin that is now commercially manufactured in Brazil. Rice lecithin is hypoallergenic and as such, will fill an immediate gap for foods that need to eliminate soy lecithin. It is expected that chocolate-based products, such as the Cadbury and Hershey labels, will probably introduce allergen-free products in which rice lecithin can play an important part.

Rice bran, from which the crude oil is removed, is called defatted rice bran. This ingredient can be considered a good source of rice protein ingredients and valuable fibre. The DSM/RiceBran Technologies partnership in a joint development program has resulted in the creation of rice bran protein hydrolysate.

Initial focus is directed towards a functional ingredient delivering approximately 40 per-

cent as well as water-soluble rice fibre. Early indications are very positive, showing properties in a wide range of products such as premium nutritive and great-tasting rice milk, nutri-bars, infant nutrition, gluten-free and allergen-free foods including dairy and soy free selections.

Looking into the crystal ball, it can be expected that ultimately whey protein isolate and rice bran protein hydrolysate will be blended to create nutritionally superior performance ingredients delivering fast and semi-fast protein sources for applications such as sports performance and preventing or delaying sarcopenia.

#### SYNBIOTIC PROPERTIES

Besides the presence of phyto micronutrients and scores of antioxidants, rice bran can now be considered a synbiotic ingredient because of the presence of both prebiotic and probiotic dietary fibre. Increasingly, rice bran is using bioscience and technology



# Gluten-Free Requirements

Food manufacturers can use rice bran ingredients to fill gaps in gluten-free foods. Gluten is a protein found in all food products containing wheat, barley and rye. Oat is gluten-free, but it can become cross-contaminated since this grain is often harvested using the same silos and harvest equipment. Therefore, people with severe gluten sensitivity are often advised not to consume oat.

Gluten-free foods claims are increasingly popular. Even people who are neither diagnosed with gluten-sensitivity and coeliac disease nor affected with Crohn's disease have become regular consumers of these specialty foods. Mainstream companies have started to notice gluten-free consumers. Only an afterthought a few years ago, being gluten-free is now en vogue even with no need to limit, reduce, or avoid gluten intake.

Many foods are naturally gluten-free, as they do not contain any wheat, rye, or barley. The term 'gluten-free' implies no gluten, but tests are not sensitive enough to detect zero percentage of gluten. The current standard for gluten-free food still is 200 mg gluten/kg or 200 parts per million (ppm). It is expected that in 2012, a new mandatory legislation will be implemented in the EU that requires less than 20 ppm gluten/kg to make

the label claim of 'gluten-free'.

A new fact sheet by the FDA (January 2012) makes it easier for people with intolerance to gluten to determine what foods are safe to eat. Coeliacs are people that have intolerance to gluten, which can develop into serious illness that can result in damage to the digestive system. As a result, the foods are not absorbed properly, which can cause poor growth, anemia, stomach cramps, and bone disease.

There are basically two categories of gluten labelling (US):

- Gluten-free with no more than 20 parts of gluten per million.
- Very low gluten with no more than 100 parts of gluten per million.

Additionally, the term 'no gluten-containing ingredients' may be used for food in which gluten has not been intentionally added. A small amount may still be present from crossover contamination with other foods. No gluten containing ingredients are, however, not controlled by the FDA regulations and therefore cannot be guaranteed that the food is in fact, gluten-free.

Improved gluten-free bread typically contains the following functional and essential ingredients: potato starch,

corn flour, a blend of three different vegetable oils, tapioca starch, egg white, stabilised rice bran, cellulose, xanthan gum and millet flakes.

When combined, these ingredients are not like the typical dough, but rather, appear as slurry. The product is then pumped into baking pans where, during baking, the slurry will regain the typical open and spongy bread structure, appearance, and characteristics. Reformulated gluten-free foods range from cereals, desserts, pancake mixes, doughnuts to health bars. Companies and restaurants that make claims about gluten content have to ensure that the foods are labelled accurately including defining strict low levels.

to maintain the purity of nutrition of nature. Soon the portfolio will include a variety of rice bran ingredients, including rice bran protein, rice fibre, rice oil, and hypoallergenic rice lecithin aimed at delivering better tasting foods with a superior nutritive profile compared to many other ingredients in the market today.

Rice bran is especially rich in saponifiable and unsaponifiable lipids including tocopherols, gamma-oryzanol and sterols. These lipids were formerly hydrolysed by lipase at the point of milling, but the new technology of stabilising basically inactivates the lipase and subsequently prevents oxidation and rancidity. The result is stable, functional rice bran with significantly extended shelf life.

**BIOREFINERY OR BIOFRACTIONING**  
Residual rice bran material offers a host of applications, particularly, rice hulls for use outside the scope of food and nutraceutical usage. Rice hulls are an obvious by-product of rice milling and have high fibre content. Current



and future usage of rice hulls are only limited by the imagination, but in principle, show potential for applications such as:

- A source for fuel conversion as inexpensive energy.
- Filtration medium for fruit juices and organic wines.
- Carrier for animal pharmaceuticals.
- Bedding for animals.
- Horticulture mixes enhancements.
- Inexpensive filler for building material such as pressboard.

There is more to come since rice bran by-products also have strong potential as further investments in bio-refinery or refractory technology, like the extraction of high value silica, come to age. With the planet's population growing by some 80 million people a year and the standard of living in developing countries improving, the demand for food and meat is growing exponentially.

It is safe to predict that providing wholesome nutrition for about 9.4 billion people in 2050 may require at least 50 percent more food than is being produced today. To meet these needs, functional ingredients suppliers need a dynamic vision for the future and ways to enhance the profitability of the entire value chain. One key to meeting this challenge is finding new and novel ways to utilise what is considered waste material like rice bran.

With its gamma oryzanol-rich rice oil, rice bran holds a plethora of bioactive compounds that slowly start to unravel several functional and nutritive applications for food, processed meat, cosmetics and pharmaceuticals. The oryzanol that remains in the rice oil has a very high anti-oxidative value.



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Rice bran protein is probably the most environment-friendly and sustainable pathway toward multigrain formulated snacks and cereal foods. Diets rich in whole grains and other plant foods but low in saturated fat and cholesterol may help reduce the risk of heart disease as well as promote healthy digestive and bowel functioning.

Clean label and reduced sodium trends are popular for now and will spur growth for ingredient innovations, which will ultimately end up in healthier foods. The number of food and beverages marketed on a whole grain platform will further dominate new product launches.

Recently released scientific data shows that a diet rich in whole grain has beneficial effects on bioavailability for heart health in general and cholesterol in particular. For example, recombining 89 percent white rice flour and 11 percent micronised stabilised rice bran will recreate original whole grain properties, bringing back the rice bran and germ which safeguards the presence of dietary fibre and other bioactive components. As such, rice bran can be a small step towards big dietary changes.

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