

POWER of the BRAN

With its plethora of benefits, rice bran is taking a leaf from whey protein in becoming a valuable ingredient from a waste by-product. The second of this two-part series will discuss some possible applications of rice bran.

By Henk Hoogenkamp

FROM a technological point of view, the stabilising properties of rice bran are very interesting and have shown capabilities in a wide range of further processed meat products. In most cases, adding a relatively small percentage allows this all-natural ingredient to wholly or partially replace materials commonly used, such as carrageenan, soy protein, modified polysaccharides and starches, while eliminating chemical-sounding E-numbers on labels which concern more consumers.

The combination of these ingredients, while maintaining all its natural origin, results in the ability to control purge in formulated meat products, increase water retention, and improve cooking yields throughout the thermal processing cycles.

There is no need to mention confusing E-numbers or chemically sounding names on product labels. Rice bran is a label-friendly, ecologically sound healthy ingredient that provides low-cost,

sustainable nutrition and applications for a rapidly increasing world population. US-harvested rice bran is GRAS, non-GMO, all-natural, hypoallergenic, kosher-parve and halal. It is expected that in the future, rice bran stabilisation facilities will be built in the major rice producing regions like China, Vietnam and Thailand.

From moisture management to being an unimposing carrier in seasoning blends, the ability of rice bran to outperform other ingredients while maintaining similar water activity levels is unparalleled. Subsequently, rice bran can be considered an essential ingredient for moisture management and nutrition across a wide variety of applications, while delivering high quality, great taste and least-cost options

In its very basic condition, defatted rice bran is a cost-effective option for use as filler in processed meat products and a stable source of fibre in whole grain foods such as cereals, crackers and batters. Defatted rice bran is also used as a fermentation accelerator, which can generate pre-and probiotics.

Rice bran is increasingly seen as an inexpensive ingredient to create or prepare trans fat-free foods, such as 'healthy' mayonnaise, salad dressings, batter and breading for coated foods.

RICE FIBRE

Rice fibre is a carbohydrate polymer with three or more monomeric units. The characterising elements of fibre are that they are neither digested nor absorbed in the human small intestine. Therefore, fibres belong to the following categories:

- Edible carbohydrate polymers naturally occurring in food and beverages
- Edible carbohydrate polymers that have been derived from food sources by enzymatic, physical or chemical treatment or processing
- Fibres should have a beneficial physiological effect and are well-researched for long-term use and benefits

Rice bran oil is generally considered to be on the higher end of the quality spectrum of vegetable oils in terms of colour, cooking stability, cooking temperature, fatty acid



composition and high levels of antioxidants, including tocotrienols and phytosterols. Along with oleic and linoleic fatty acids, these compounds are linked to lower cholesterol levels.

PAIN RELIEF

Beyond its potential applications in the food chain, rice bran has many bioactive extracts and components that show potential in health foods, cosmetics and pharmaceuticals.

Increased intake of whole grains and bran, in particular, may reduce the incidence of hypertension. Compelling indications show that rice bran and its fractionated extracts or compounds will move beyond the explorative stage within a few years and develop into serious remedies for conditions like inflammatory relief associated with osteoarthritis and rheumatoid arthritis, immune boosting and anti-viral effects.



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Arthritis is especially targeted since it is a debilitating disease that affects one in five adult Americans or about 42 million people. By 2020, that number may reach 60 million and the European Union will not lag far behind.

Rice bran extracts and compounds show inhibitory activities against the key pro-inflammatory enzymes cyclooxygenase (COX) and lysyl oxidase (LOX). Arthritis is an inflammation of the joints that can develop into a chronic condition involving swelling, pain and restricted movement. Osteoarthritis or rheumatoid arthritis may result from a deregulation of pro-inflammatory cytokines as well as COX and LOX enzymes.

Rice bran extracts show strong promise for safe and effective treatment of arthritis. There is little doubt that specially formulated lifestyle foods targeting the growing numbers of arthritis sufferers will become an important new category.

INTRIGUING SOLUTION

Rice bran is a hypoallergenic, cold water functioning and performing solution that boosts stabilising and texturising properties. It also offers cost optimisation that helps food formulators upgrade to a clean label and additive free positioning for their products.

Rice bran protein offers instant viscosity-modulation properties, stability and texture to a broad range of processed food and meat products. The powdered functional ingredient rapidly hydrates and disperses in water without lumping to deliver a unique harmonisation with other support ingredients, such as added protein and starch. Its process tolerance ensures good resistance to a wide pH spectrum, shear and heat variations during processing.

Rice bran has a slight nutty, honey-like flavour that allows the richness and diversity of flavours to prevail in a range of quality convenience foods. Food and meat processing today is confronted with a number of health considerations and emerging challenges: sodium reduction, fat replacement, meat protein alternatives, protein fortification and green-label messaging. Rice bran provides at least some of the answers.

The ingredient has solid authenticity and is globally recognised, ranking among the most consumer-friendly ingredients. Rice bran's natural origin will become a significant marketing tool as the trend towards clean and environmental-friendly labelling intensifies. Already popular in dietary supplements and functional foods, rice bran is now increasingly crossing over into mainstream foods.

Rice bran protein offers cost-effective functional properties like enhancing and stabilising meat emulsions and coarse-ground meats, such as burgers and patties. Equally important, the ingredient has a friendly eco-footprint and environmental image that is reflected in label declarations on food packaging. Because rice bran protein retains moisture, it improves the shelf life of meat products, enhances the nutritional profile, and adds fibre.

Both soluble and insoluble fibres are naturally present in rice bran, making it likely to become the choice ingredient for products targeting a health-conscious niche. Along with helping meat processors develop healthier formulations, the use of rice bran protein can generate significant cost savings, compared with expensive alternatives such as soy protein and mustard flour.

RICE BRAN OIL

The crude rice bran oil is composed of 88 percent



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Rice bran has potential to be used in a wide range of applications.

neutral lipids, four percent unsaponifiables, and two to four percent free fatty acids. The unsaponifiable fraction is of great interest since these include a mixture of naturally occurring antioxidant compounds, such as vitamin E and gamma oryzanol.

Hexane is usually utilised as the solvent to extract the rice bran oil from the rice bran. Furthermore, short chain alcohol like ethanol and isopropanol can be used as an alternative to hexane. In general terms, alcohol extracted or ethanol extracted rice bran oils yield higher amounts of unsaponifiable compounds and tocopherols (vitamin E) and vitamin B.

By limiting the free fatty acid content in rice bran oil, the colour can be improved. Hence, it is likely that hexane extraction ultimately has too many drawbacks. It can then be expected that ethanol or alcohol extraction will be used in combination with enzymes to improve yield and quality.

Rice bran oil includes highly valuable minor components, such as gamma oryzanol, tocopherols, tocotrienols and phytosterols. The recovery yield of these minor components is greatly influenced by the method of refining, ie: chemical or physical refining. During deodorisation, the highly volatile fractions like phytosterols and tocotrienols are removed while the non-volatile gamma oryzanol is further fractionated.

Physical fractioning or refining will be the

method of choice for premium rice bran oil production. Physical fractioning is a process that is not only free of environmental impact but also safe and simple, providing quality oil with good colour and virtually no odour.

Gamma oryzanol contains ferulic acid esters and is known to be a very effective antioxidant even at high temperatures. It has been demonstrated that gamma oryzanol is four times as effective as vitamin E at inhibiting cellular oxidation.

Rice bran oil has hypocholesterolemic influence with decreased low density lipoprotein (LDL). This effect is due to the presence of high concentrations of unsaponifiables including phytosterols, oryzanols and tocotrienols. The potent antioxidative properties of gamma oryzanol also act as a protective agent against UV light.

The ferulic acid present in oryzanol prevents or slows down skin damage or ageing. Also, the presence of tocotrienols has a very positive effect on skin and can be considered a first line of defense, as they neutralise or stabilise the free radicals generated in the skin when exposed to UV rays. Because these compounds can penetrate the skin quickly and get absorbed rapidly, they can help in skin repair.

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