Sustainable Solution

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by Henk Hoogenkamp

The world economic financial crisis has also severely affected the food industry. Food R&D has come to a T-junction and marketing either will need to take the high road and maintain the time-tested proven formulae, or engage in further cost reductions. In many cases it has come to the point that the so-called extenders such as soy are now replaced by cheaper alternatives.

There is little doubt that the food, beverage and meat industry is competitive and highly complex. Food research increasingly will need to focus on health, well-being, nutrition and affordable or enhanced value.

It is almost certain that 2008 and 2009 will go into history as years of unprecedented economic contradictions.

At first, the global food industry was rather suddenly confronted with supply-chain shortages, sharp rising prices and political unrest. On the heels came 2009 with a sharp drop in demand that translated in excess stock at bargain prices. In just a matter of a few months, food-for-oil, or ethanol heralded as the saviour of the world gone bust into oblivion and many idle ethanol plants.

Malnourishment is rapidly spreading beyond poor developing countries and into the heart of the affluent world. The United Nations FAO estimates that, since January 2009, 1 in 10 US citizens or some 32 million people receive food aid. Compared to 2000, this is an increase of a staggering 17 million. The reality is hard to grasp if one knows that for the first time ever, there are now an equal number of 1 billion people that are chronically hungry and 1 billion people that are obese. When put in context of the current world population of 6.5 billion, these extremes on either side are mind blowing.

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Rice Bran Reinvented

Merely acknowledging a problem is not the same as addressing it. Until only a few years ago, rice by-products were universally considered waste material. Patented technology now allows massive increases in total output, higher volume throughput and cheaper solutions by using modern stabilizing equipment and innovative technologies. Derived from whole grain rice, stabilised rice bran can be used in a variety of products, including nutri-beverages, cereals, baked goods, nutritional supplements and processed meat. Stabilised rice bran is derived from natural GMO-free rice by-products with absolutely no processing aids added. The ingredient has a slight mild honey-like sweetness and taste. This feature gives stabilised rice bran more range for flavour development as opposed to, for example, soy ingredients.

Stabilised rice bran is a source of synbiotics, tocols, yoryzanols, polyphenols, nutritive protein and healthy mono-and polyunsaturated oil. The main fractions are protein, oil and fibre. Until 2007, stabilised rice bran was a highly under utilised resource for value added food.

The reason being: an endogenous enzyme lipase activated during milling rendered the bran unsuitable for consumption because of pro-oxidative mechanisms leading to rancidity. Patented technology and engineering breakthrough now allow the lipase enzyme being inactivated by heating the rice bran at 130-140°C for a short time, yielding a stabilised bran without any of the traditional drawbacks.

Sustainable Source

At a potential annual world availability of approximately 70 million metric tonnes, stabilised rice bran is a perpetual winner because rice is the overwhelming favourite staple of at least 60 percent of world's population. The ingredient is inexpensive and a sustainable source of wholesome nutrition with a low ecological and environmental footprint providing functional properties for a host of food, beverage and meat products.

As such, stabilised rice bran modulates, enhances and differentiates existing and new food products by providing innovative solutions through application creativity and significant cost reductions. Compared to soy isolate, stabilised rice bran is on average 70 percent lower in price. The once obscure and ill-used rice

bran can now be successfully taken into a sustainable food chain. Food quality is a major issue for most of the processed food industry both in terms of nutrient availability and delivery. In a relatively short time, stabilised rice bran has become a universally accepted aesthetic, cultural and functional ingredient at low price points. Therefore the ingredient can be considered a sustainable stimulus for both developed and developing countries.

While consumers in developed countries specifically target food in relation to wellbeing; consumers in developing countries continue to increase consumption of primary food groups such as meat, dairy and vegetable oil. Stabilised rice bran perfectly fits in these emerging categories by providing complex fibres together with a stable 'emulsion' of healthy oil and protein.

Formulation Economics

Consumption of dairy and processed meat products and current economic woes are a contradiction in terms: The market for meat is still trending upward and providing ample opportunity for additional growth. It is time however, for the food service sector and retailers alike to come to grips with the fact that consumers are trading down. Family budget cuts transcends food purchases, yet consumers are reluctant to trade convenience for inconvenience. Also important to understand are the subtle preference changes in consumer' age groups. While baby boomers prefer fish and aquaculture foods, Generation Xers are still in the steak-mode while Generation Yers leaning towards gourmet, chicken and natural foods. Yet, the latter group of consumers tends to become bored rather quickly and show little brand loyalty.

Food formulators are swimming in choppy waters these days. The consumers acquiesce and may want to start looking for alternatives. Non-traditional economic hardship might crossover in non-traditional (purchase) behaviour. Subsequently, it is plausible that consumers become intolerant of irritating behaviour on the part of providers for services and branded foods.

It is difficult to take costs out of food formulations while maintaining quality customers have come to expect. Many leading consumer brands mandate their R&D department to do just that. An example: The economic realities have longtime users of functional soy ingredients rethink their position. Efforts to reduce or eliminate expensive soy isolate are part of a trend. Meat processing companies have long known that they need to break their dependence on inflated inclusion levels of soy ingredients.

Using stabilised rice bran in food and processed meats is a budget-minded approach that seems to resonate with businesses that need to drive down formulation costs.

Functional Food

Nutracea (NTRZ) is the world leader in stabilising rice bran and operates manufacturing facilities in the US, Brazil, China and Indonesia. It is estimated that annually some 70 million metric tonnes of rice bran can be captured and turned into a wholesome and functional food ingredient. The company continues to fast track and expand its business including providing solutions for a growing number of food applications.

A clean and non-chemical and non-invasive manufacturing process allows the preservation as well as the nutritive advantages nature intended. Additionally, stabilised rice bran is hypoallergenic (no-allergy response), contains no trans fat and cholesterol, not to mention that it is GMO-free.

It can be hypothesised that betaglucan, a natural polysaccharide, present in stabilised rice bran, slows down the retrogradation of starch/protein gels when kept in refrigerated storage. For an emulsified meat product such as a hotdog, this feature will translate into higher processing yield and less purge. Of course, the fibre-length of the insoluble fragments also plays a decisive role and is associated due to its unique molecular weight and structures naturally present in the rice bran. During thermal treatment of the meat emulsion or meat matrix system, the protein and oil of the stabilised rice bran act as a micro-particle dispersion, which assists in a decreased electrostatic repulsion allowing close contacts between protein polymers and gel network formation. The latter property will reduce interfacial surface tension, and thus increases stability.

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Stabilised rice bran contains an approximate insoluble versus soluble fibre ratio of 5 to 1. Rice bran exhibits a high digestive tolerance that occurs along the whole digestive tract with no excessive fermentation in the large intestine that would cause flatulence or abdominal pain. Of the 100 percent ingested fibre, it is estimated that some 10 percent is hydrolysed in the small intestine, some 80 percent progressively ferments in the large intestine and the remainder excreted in the faeces.

Fibre Deficiency

As a result of modern lifestyles, over the years diets have become deficient in fibres, some of which have dropped to an alarming 15g/day, compared to a recommended daily intake of 25-30g/day.

For optimum health there need to be a certain balance between the intake of soluble and insoluble fibre. Insoluble fibre is not digested and less fermented in the digestive tract. Increasingly, awareness grows that fibre plays a dynamic part in the diet.

The simplest effect of dietary fibre is normalising transit time in the digestive tract. The physiological benefit of fibres is as complex as the fibres themselves. Insoluble fibres keep moving through the colon, while soluble fibre swell and slow movement through the small intestines.

Subsequently, the water swollen soluble fibres trap bile acids squirted into the small intestines from the gall bladder to assist fat digestion. In a way, bile acids act as a fat emulsifier that contain liver cholesterol and stored in the gall bladder until the moment of food intake. Dietary soluble fibre traps much of the bile acids and thus prevents absorption. This mechanism draws the cholesterol out of the blood that usually results in a healthier cholesterol profile.

Dietary Essential

Dietary fibre comprises insoluble fibre and soluble fibre. Insoluble fibre is the most abundant carbohydrate structural material in nature and makes up some 60 percent of all fibre in most plant foods. The primary component is cellulose that is insoluble in water, dilute acid and dilute alkali.

The linear polymer of beta-D-glucose molecules is indigestible by the human body because of lack of enzymes that hydrolyse these beta linkages. As such cellulose material is not interactive with other molecules such as free fatty acids.

Hemicellulose is also insoluble in water, though soluble in dilute alkali, which contain various heterosaccharidic polymers consisting of two or more sugars such as xylose and galactose.

Resistant starch passes undigested through the small intestine and into the large bowel where it is fermented and excreted. Lignan is an important component of dietary fibre as well and is resistant to enzymatic breakdown in the small intestine and bacterial breakdown in the large intestine. Thus nearly all lignin present in food is recovered in the faeces.

It is well documented that fermentation of complex carbohydrates that escape digestion have beneficial effect on colonic health; increasing stool volume, shorter intestinal transit time, production of short-chain fatty acids and a decrease of colonic pH. Bacteria that may ferment the complex fibre present in stabilised rice bran are likely from the glucidolytic flora and as such increase to the detriment of proteolytic species such as clostridium Perfringes because of the promotion of acidic conditions in the gut. In a way, therefore, the insoluble fibre can be seen as a prebiotic.

Functional Rice Fibre

Discussions on dietary fibre always include functional properties as well as organoleptical parameters. Generally, insoluble fibres are higher in molecular weight and size. In contrast, soluble fibre is smaller in size. Insoluble fibre can be considered for bulking and structure building in foods, while soluble fibres are more sugar-like and sweeter.

High-fibre foods increase the feeling of satiety and provide more nutrients with fewer calories. In short: Increasing the intake of insoluble fibre promotes bowel regularity and increasing the intake of soluble fibre supports healthy lipid and glucose levels already in normal range.

Usually it is easier to formulate with soluble fibre than with insoluble fibre. To increase inclusion level of insoluble fibre, it might be useful to reduce its particle size into smaller molecular weights. Reducing chain length at point of manufacturing can have a significant impact further down the processing lines. Also, increasing inclusion level of fibre can typically reduce calories while increasing dietary values.

The FDA defines a ‘good source’ of fibre as providing a minimum of 2.5 grams of fibre per serving. An ‘excellent source’ of fibre contains at least 5 grams per serving. In the EU these guidelines are at least 3% and 6% of the product formulation respectively.

The verdict is still out, but it is generally accepted that the optimum ratio of insoluble versus soluble fibre is 2:1 to 3:1. Stabilised rice bran has a natural ratio of approximately 5:1 which makes it a good choice for food formulators.

The intrinsic value of stabilised rice bran is more than the individual components alone. Besides the protein and oil component that enhance thermal stability, rice bran has a complex fibre structure that shows synergistical behaviour when used in conjunction with structuring and gelation support ingredients such as milk protein and soy protein Future enzymatic technology progress will no doubt make the natural rice fibre more accessible to digestion by beneficial bacteria in the large intestine.

These developments will further enhance the performance of the activated rice fibre act as a prebiotic substrate for the intestinal flora. It is obvious that soon stabilised rice bran allow product positioning as several health-promoting phytonutrients protect against cellular damage and a host of other chemical reactions in the body.

Genius Gluten Free fresh breads include rice bran in their formulation (UK).

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