

Rice bran isolate: the alternative

Processed meats make up half of the world's annual output of one million-plus metric tons of functional soy protein. However, concerns over soy's price increases, allergic potential, conflicting health claims, and the emergence of newer functional systems threaten its hegemony. Rice bran isolate could be the alternative!

Despite the thousands of lifestyle, nutraceuticals and analogue food products formulated with soy protein, the primary application for functional use worldwide remains processed meats. The health food category gets the attention, but it's fair to say that the soy protein industry may well collapse without the global market for processed meat applications. Over 210,000 mt of soy protein isolate is used annually for emulsified meat formulations, such as hot dogs and deli meats, not to mention large soy protein usage in coarse ground and whole muscle meat products. Serious issues surrounding meat production and ingredient technology are impacting soy's world market. Soy protein isolate has a proven track record for its use in these formulated meat products, though consumer acceptance in some countries such as the US remains questionable, while industry utilisation across the developed world has probably peaked due to inflated inclusion levels having a detrimental effect to general product integrity. Also, many meat processors are looking for ways to replace expensive vegetable protein sources and substitute them with equally well performing lower cost solutions.

World food price hikes

According to FAO projections, consumers worldwide will face more expensive foods for at least 10 years. In the past, soy protein marketers have attacked the meat industry with a clear message: soy protein as a key human nutrient reduces environmental impact by eliminating the wasteful conversion of soy into animal feed and secondarily into meat. How wrong they were! The soy protein industry's position has become a double-edged sword. Functional soy manufacturers need the processed meat industry to sustain their own existence, but their business strategy focuses on replacing lean meat with soy-based alternatives. Moreover, at the lower end of the analogue category, burger patties based on low-cost textured soy protein (TSP) are becoming more expensive than the lower-end meat-based alternatives. Thus, the soy protein industry's green messaging about vegetable protein-based foods being cheaper doesn't always resonate with consumers.

Rice: "Soy's non-allergenic competitor"

There is strong medical evidence that food allergies, including soy allergy, is increasing among Western



An inclusion level of 1-2% rice bran into the mixer will be sufficient.

populations. Concerns over these allergies make it difficult for soy to be considered the lead protein in food applications. A potential challenger for soy protein in processed meat applications is a newly developed functional as well nutritive ingredient made from rice. Rice has been a traditional nutrient-dense food source for nearly all cultures for thousands of years. Until recently, rice bran - a by-product of rice milling - did not contribute to greater value and was considered unfit for prolonged storage and consumption. It is probably true that rice bran is the world's most underutilised food source. Fortunately, new and proprietary technology has become available to neutralise enzymes that cause rice bran rancidity.

No more rancidity

Traditional rice milling methods caused kernel enzyme lipase to

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Alternative for soy protein?



leach into the bran, causing almost immediate rancidity and thus rendering unfit for human consumption. Now that new stabilising technology - including non-chemical inactivation of lipase - has become available, rice bran is no longer viewed as a waste material. This proprietary technology has now given the world a premium ingredient known as rice bran isolate. As a result, for new food product development, allergen-free functional ingredients can replace all or some of the traditional supporting proteins in often very complex emulsion systems. As such, a new challenger in processed meat applications is the newly developed functional nutritive rice bran isolate.

This ingredient is showing great potential in food and processed meat products. In fact, it is likely that rice bran isolate will soon start to challenge the leadership of soy protein isolate in emulsified meat as well as coarse ground meat products. After all, it is no doubt

that this segment has the largest potential and is probably ready for (part) replacement. It is no secret that meat processors are faced with a balancing act between choosing ingredients that deliver performance and getting the health positioning they want.

A non-allergic binder

NutraCea, a pioneering food ingredient company in the US, has developed a proprietary and patented application technology and will soon start to target processed meat applications using rice bran isolate as a key ingredient to optimise product quality.

A number of research studies at meat laboratories of Iowa State University, the Philippines and both pilot as well as full-scale plant evaluations in Europe, have confirmed the ability of rice bran isolate to immobilise or bind water at higher intensity for a longer period of time than soy protein isolate up to an inclusion level of 4.0%. NutraCea is about to embark upon an inclusive dynamic vision process, bringing together premium functionality, health attributes coupled on major cost savings compared to soy protein isolate solutions. The rice bran isolate will be marketed under the trade name RiBran and is available in a granular form as well as powder-fine. The latter types allow the ingredient to be used in a wide range of specialty blends that are gaining popularity for direct addition for both meat-emulsion and coarse-ground meat systems.

Rice bran isolate is a non-allergic binder ideal for use in processed meat products. Its texturising

capacity is remarkable and meat processors, who have replaced the soy protein in their formulas for reasons such as to eliminate allergic warning labels, discovered these rice derivative alternatives to be a favourable replacement.

A natural for meat inclusion

RiBran isolate contains a dietary fibre with functional physicochemical, sensory, organoleptical and texture values in both emulsified and coarse-ground meat products. The ingredient has proven texturising abilities and will offset the detrimental effects of high inclusion level soy protein containing meat products. For the latter products such as chicken patties, an inclusion level of 1-3% stabilised rice bran resulted in a significant decrease in cook loss values, while increasing juiciness and texture. There were no adverse effects on sensory attributes such as colour, flavour and bite. However, it is fair to report that at increasing levels of stabilised rice bran there is a tendency of developing a slight off-white colour in all-breast chicken formulas. At first impression, functional rice bran isolate and soy isolate seem to compete for share of formula. This is indeed seemingly true for processed meat products with a low inclusion level. For these premium products it is a question of either rice bran isolate or soy isolate. After all, it is well known that ingredients that are able to synergistically increase dry matter content in an emulsion generally contribute to improving quality. However, at reduced levels of lean skeletal meat, there will be a need to reinforce the

What is rice bran isolate

Rice bran isolate is a combination of naturally occurring soluble and insoluble fibre fragments, and a balanced spectrum of hypoallergenic nutritive protein, saturated, mono- and polyunsaturated fats with the added benefit of the prevention of cardiovascular disease by improving serum cholesterol levels. It should be mentioned that rice bran isolate is free from cholesterol. It also contains naturally occurring sources of antioxidants such as γ -oryzanol, tocopherols and phytosterols, which are potent hurdles in preventing rancidity in processed meat products.

The latter can be determined by measuring peroxide value, iodine value and free fatty acid content. Therefore the use of rice bran isolate – beyond functioning as a texturizing stabiliser in emulsified and coarse ground meat products – can be seen as a natural solution rather than artificial additives such as butylhydroxyanisole (BHA) and butylhydroxytoluene (BHT). Subsequently, the antioxidative property of rice bran isolate taps into the ‘natural food’ trend, and groups this ingredient with other natural antioxidants, such as herb extracts, tocopherols (vitamin E) and ascorbates (vitamin C).

Rice bran contains a comparatively high percentage of protein which, in principle, can be isolated to a protein content of up to 90% with a well-balanced amino acid composition. As such, rice protein is very suitable for a plethora of health foods, including formulated meat analogues. The functional properties are on par, if not better, than other sources of vegetable protein such as soy and pea protein.

TABLE - STABILISED RICE BRAN DATA

| | Content |
|---------------------|---------|
| Protein | 12-16 % |
| Fat | 18-23% |
| Total carbohydrates | 45-55% |
| Total dietary fibre | 23-35% |
| Soluble fibre | 2-6% |
| Ash | 7-10% |
| Moisture | 4-8% |
| Free fatty acids | <4% |

emulsion or meat batter with increased levels of functional ingredients. For these products soy isolate and rice bran isolate can be considered synergistically; when properly applied, soy protein isolate can provide a mechanism to reduce surface tension at the fat:water interface, while rice bran isolate absorbs and immobilises free- and extra-cellular water together with added formula water.

For all these variables, rice bran can be considered a welcomed tool for alternative solutions while significantly improving bottom-line performance and economics.

Inclusion levels

For premium emulsified meat products an inclusion level of 1-2% rice bran isolate will be sufficient. The functional ingredient performs best when added in dry form directly into the chopper or mixer-blender. Especially the coarse or granular type of rice bran isolate is suitable since it does not contribute to any dusting, while providing almost immediate particle breakdown through friction. Subsequently, it quickly increases water absorption. Unlike soy protein isolate, which at increasing levels has a tendency to increase pH and weaken meat colour, rice bran isolate will not affect these variables. On the contrary; because of the strong antioxidative properties of rice bran isolate, shelf-life and colour

generally improves in cured meats. Also, formula that is based on mechanically deboned chicken or turkey meat requires a relatively low inclusion level of rice bran isolate: < 2.0%.

It is generally known that high inclusion levels of soy protein isolate reduce the typical cured colour of processed cooked meat products. Although, in comparison, rice bran isolate will somewhat weaken the cured colour after 45 days of storage, the colour weakening is of less intensity as soy protein-based formulas.

After 2 and 4 weeks of refrigerated storage, the purge was significantly lower when rice bran isolate was used at 3.0% compared to the control product. Increasing the refrigerated storage to 12 weeks, the formula’s containing as little as 1.5% rice bran isolate showed also significantly less purge compared to the base control formula.

In terms of shelf-life it can also be noted that rice bran isolate contains considerable amounts of antioxidative flavones, not to mention the inherent benefits of superior freeze/thaw properties for hot dogs sold to the so-called “wet markets” in developing countries for refrigerated storage of up to 90 days.

Sensory evaluation showed that trained panellists were unable to detect differences between base control without added functional ingredients, and the various test products containing from 0.5-3.5% rice bran isolate for interior firmness, interior cohesiveness and rancidity during the entire storage period of up to 90 days. However, it should be noted that at rice bran isolate inclusion level levels of 3.5% and higher, the sausage is perceived as somewhat less juicy compared to the control formula. PPM



Sausages containing rice bran.