



I Pires, Évora, Portugal

WITH the planet's population continuing to grow by more than 70 million people a year and the quality of life in developing countries improving, the demand for food and meat is growing exponentially. It is not a far stretch to predict that to provide wholesome nutrition for some 9.3 billion people on planet earth 25 years from now may require

at least 50 percent more food than today.

To meet the needs of the rapidly developing food business, suppliers of functional ingredients need to create a dynamic vision for the future and to identify trends to enhance the profitability of the entire value chain. This includes finding novel ways to utilise previously unassuming waste material such as rice bran.

Rice bran is well known and researched. However, stabilisation technology has only recently become available which has catapulted rice bran into the limelight for functional and nutritional use in processed food and meat products.

Because of its health benefits, rice bran has become a popular ingredient in dietary supplements and functional foods. Now this ingredient is increasingly making crossovers into mainstream foods such as processed meats and meatless varieties.

Stabilised rice bran has potential for functional properties enhancing and stabilising meat emulsions and coarse ground meats such as burgers and patties. But equally important, the ingredient has a friendly ecological footprint and environmental image that is reflected on the labels of consumer food and meat packagings.

AS A FOOD SOURCE

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

Stabilised Rice Bran: THE BETTER Alternative



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Although it only takes up approximately eight percent of the kernel volume, 65 percent of the nutritional value of rice is in the rice germ and bran.

consumption. It is probably true that rice bran is one of the world's most under utilised food sources.

Fortunately technology has become available to neutralise enzymes that cause rancidity. Methanolic treatment of volatile rice oil components is one of the stabilisation steps that results in a product delivering a natural ingredient that contains nutritive fibre, a rich source of B complex vitamins, minerals, phytosterols, over 100 antioxidants and a stable oil and protein fraction.

Traditional rice milling methods causes kernel enzyme lipase to leach into the bran, inducing almost immediate oxidation and rancidity and thus rendering unfit for human consumption. Now that stabilising technology – including nonchemical inactivation of lipase – has become available, rice bran is no longer viewed as a waste material. This proprietary technology has now given the world an ingredient known as stabilised rice bran.

This ingredient is showing potential in food and processed meat products. It is likely that stabilised rice bran is about to challenge the leadership of soy protein isolate in emulsified meat such as hotdogs as well as coarse ground meat products like burgers and patties. After all, this segment has the potential and probably is ready for (part) replacement and quick conversion.

NutraCea, a company providing rice bran based in Phoenix, Arizona, US, has a programme to target processed meat applications using stabilised rice bran as a key ingredient to optimise product quality. Together with wheat, soy, potatoes and corn, rice belongs as one of the world's main crops for nourishment of billions of people.

Following the completion of a series of research studies at universities and plant tests, the rice bran will be a welcome addition to the portfolio of a food technologist looking for a replacement or enhancing soy isolate.

Stabilised rice bran has been approved by USDA/FSIS (US Dept of Agriculture, Food Safety and Inspection Service) for use as a binder in various meat and poultry products. The approval opens the way for US meat processors to formulate this functional ingredient in products such as sausage, chicken patties, meatballs, meat loaf and meat patties.

NATURAL FOR MEAT INCLUSION

The emergence of stabilised rice bran with approximately 29 percent total dietary fibre not only has beneficial physiological effects, it also provides technological advantages including offsetting the negative texture and flavour effects of fat reduction.

RiBran Isolate contains a dietary fibre with functional physicochemical, sensory, organoleptical



Before and after shots of extruded vegetable protein stimulating shredded corned beef as a functional meat replacement.

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 percent stabilised rice bran resulted in a significant decrease in cook loss values, while increasing juiciness and texture. No adverse effect on sensory attributes such as colour, flavour, and bite, albeit 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.

Because of price competition over the past 20 years, meat processors have reduced the inclusion level of lean meat or substituted with less technologically favourable meat cuts. Some also introduced mechanically deboned meat from least cost options such as chicken or turkey.

As a side note: stabilised rice bran, like soy concentrate, also contains fibres. However, unlike soy protein concentrate, stabilised rice bran does

not contain unfavourable residual carbohydrates such as stachyose and oligosaccharides raffinose that may cause flatulence and negative soy flavour taste associations.

THE RIGHT AMOUNT

For premium emulsified meat products an inclusion level of 1 - 2 percent stabilised rice bran will be sufficient. The functional ingredient performs best when added in dry form directly into the chopper or mixer-blender. In particular the coarse or granular type of stabilised rice bran is suitable since it does not contribute to any dusting while providing almost immediate particle breakdown and very rapid hydration that is also assisted by the blending or chopping friction. Subsequently, it quickly increases water absorption.

It is a fair and true conclusion that stabilised rice bran does not offer a high emulsification capacity as some animal or vegetable proteins, and does not equal water-binding properties as certain fibres. However, at moderate levels of inclusions, stabilised rice bran provides functional solutions with regard to cost, texture and flavour when used in a wide range of emulsified meat products.

Because of the many variables such as specific type of processing equipment, formulation and availability of raw materials, it is very difficult, if not impossible, to give precise application and dosage information. For example, soy concentrate generally performs better in a low-energy emulsion system, while soy isolate performs better in a high-energy emulsifying system.

Stabilised rice bran is notably better to balance flavour. A solution would be a small amount of sweet whey powder to balance flavour favourites. Extensive consumer panelling has indicated that strong preference is given to hotdog products formulated with the rice bran mainly because of the lack of detectable and undesirable soy flavours.

REAL-WORLD APPLICATIONS

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. The consumer gets the nutritional enhancement and improved finished product while the producer gets the cost savings.

A number of research studies at Iowa State University in the US, the Meat and Fat Research Institute in Poland, and both pilot as well as full-scale plant evaluations in Europe, the Philippines and Thailand 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 percent.

Bernard Chu, CEO and owner of Turriss Philippines, one of the largest food ingredient suppliers in the South-east Asia region, had his team of food technologists working with stabilised rice bran fully endorse its value in the low cost Asian style meat products.

Henry Martin Glover, senior meat scientist and technical & operations director for Turriss Philippines, states these cost-driven markets are constantly looking for new innovations to achieve or simulate a quality product at an acceptable price that suits the purchasing power of the consumer.

Mr Glover is convinced that this new innovation is a welcome addition to the world of processed meat. In the Philippines, hotdog is the number one processed meat with a total of 750mt being produced per day across the country. During difficult times of increasing prices on all raw materials this will come as a two-way benefit; the consumer gets the nutritional enhancement and improved finished product while the producer gets the cost savings.

In recent times the increasing cost of raw materials has fallen on the producer who simply can't pass the increase on to the market due to the static daily salary of the masses in the lower-end Asian countries. Fears of doing so and losing market share are great resulting in a steadily dilution of margins.

The Philippines and neighbouring countries have picked up quickly on the inherent quality and application properties of stabilised rice bran. During actual meat emulsion processing it has been determined that, when used, stabilised rice bran is an ideal ingredient to manipulate thermodynamical considerations.

It is a well-known fact that each and every meat emulsion has a certain preferred time: temperature optimisation in which processing equipment and ingredients can be used to reach preferred temperature specifications. Immediately after the addition of the stabilised rice bran into the chopper or blender, the rice fibre starts to attract water and swells. This phenomenon can be described as a gritty look and feel. However, during the cook cycle the gritty appearance and taste will disappear totally.

PRACTICAL EXAMPLE

An example of the reformulation of a typical Asian low-cost hotdog with low meat content: lean meat 20 percent, fat 14 percent and added water 36 percent. Some three percent soy isolate and two

percent of food starch was taken out and replaced weight for weight by five percent RiBran Isolate.

The stabilised rice bran was added into the chopper just after the fat. The stabilised rice bran hydrates very rapidly and takes up water quickly. It is therefore important to ensure that sufficient free processing water is available in order not to 'overheat' the emulsion temperature. Compared to the soy isolate control hotdogs, the stabilised rice bran formulated product was rated only slightly softer in texture. However, the flavour scored much better than the soy isolate control.

The hotdog with the stabilised rice bran seems to have been able to hold flavours much better and



In controlled tests, there was no noticeable difference between hotdogs with stabilised rice bran and soy isolate emulsion.

was noticeably sweeter. For premium hotdogs, with a total of lean meat and fat of 60 percent, some three percent soy isolate was replaced weight for weight with stabilised rice bran. Again, it seems necessary to slightly alter the colour of the emulsion, but sampling the finished products no panel member could detect which one was the control with soy isolate or the test with stabilised rice bran.

Backed by application research at leading meat institutes and universities in the US, Poland and Asia, as well as ongoing market success stories, it can be concluded that stabilised rice bran offers opportunities to fully or partly replace soy ingredients.

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