

Protein fortification of acidic beverages: A clear opportunity

Protein fortification of beverages with soy protein isolates offers certain advantages over the use of whey protein isolates

Protein is well recognised as a healthy and nutritious component of foods. Beverages, which are a convenient and widely accepted means of supplying protein, can be categorised by their pH as “neutral” (pH about 6.5 to 7.0) or “acidic” (pH about 3.0 to 4.4). Milk, soymilk and the majority of other protein-containing beverages currently on the market are neutral. Acidic beverages, a category that includes carbonated and non-carbonated soft drinks, sports drinks, energy drinks, fortified waters, juices, etc., have traditionally not contained protein, principally for the technological reasons described below.

Protein isolates are however now emerging that are highly suitable for use in acidic beverages. Given the emergence and popularity of functional beverages, as well as the growing focus of the general public on health and wellness, the timing of this new development is optimal.

Fortifying beverages with protein: The benefits

The most fundamental benefit of formulating a beverage with protein is an improvement in the nutritional value of the product. Dietary protein supplies amino acids that the body itself cannot synthesize. Protein incorporation in the beverage would, therefore, improve the nutritional profile of any type of beverage. However, from a consumer-perception standpoint, this nutritional boost may be particularly valuable in carbonated soft drinks or other products that are frequently perceived as an indulgence item or a less healthy choice.

Apart from the general nutritional advantage, protein may be included in beverages to offer more specific benefits. For example, consumption of protein is known to play a valuable role in recovery from exercise, and may also be of value during exercise. Given that sports drinks are already well known as a source of hydration and energy for athletes, inclusion of protein into sports drinks seems a good fit. A number of publications have suggested that sports drinks containing protein and carbohydrate offer more benefits to athletes than sports drinks containing carbohydrate alone. While much of the research on the benefits of protein consumption and exercise has been conducted using whey protein, there is some published evidence that soy proteins can perform just as well in promoting muscle protein synthesis and recovery after exercise.

Protein incorporation in beverages can also offer the benefit of specific health and wellness effects. Again, these effects would apply to all beverages formulated to contain protein, but many functional beverages for sale today are marketed based on their health and wellness impacts. Proteins are believed to be more satiating than carbohydrates or fats, suggesting their use in beverages targeted for weight control. A number of other specific health-related benefits have been linked to the consumption of proteins of different origins. Just considering soy protein, its consumption (and its associated minor components) has been linked to a reduced risk of illnesses such as coronary heart disease, osteoporosis and certain cancers. The relationship between soy protein and heart disease is particularly significant, as the FDA in the United States has allowed a health claim on



Burcon's Clarisoy soy protein isolate is 100% soluble in acidic beverages like fruit juices.

INGREDIENTS



food labels stating that “Diets low in saturated fat and cholesterol that include 25 grams of soy protein a day may reduce the risk of heart disease”. A number of other countries have allowed similar claims. To qualify for the US FDA claim, a serving of food must contain 6.25 grams of soy protein and be below certain limits for fat, saturated fat, cholesterol and sodium content. For a 16-ounce (473-mL) bottle of beverage for which the entire bottle is the serving size, the approximate required level of soy protein is only 1.3%.

Fortifying acidic beverages: The set-backs

Protein fortification of acidic beverages has in the past typically been limited by the poor solubility of protein ingredients due to the pH of the beverage. Such poor protein solubility would preclude the preparation of transparent beverages, and introduce issues with settling, texture and mouthfeel. Improved solubility characteristics could be obtained by utilising hydrolysed proteins, but flavour issues limit the use of these products. Some whey protein isolate products have become available that are transparent and suitable for use in acidic beverages, and a

number of beverages containing these proteins have entered the marketplace. It is a tremendous advantage for the protein to be transparent in acidic solution, as it allows the protein to be used not only in transparent acidic beverages but also non-transparent beverages in which a certain level of opacity is desired.

A soy protein that fits the bill

Two plant protein isolates that are transparent in acidic solutions and suitable for use in acidic beverages have recently been developed by the Canadian company Burcon NutraScience. One product, called Clarisoy™, is a soy protein isolate, while the second product, Supertein™, is a canola (also known as rapeseed) protein isolate. This discussion will focus on the former product: Which is at present a pre-commercial product. However, Burcon NutraScience has entered into material transfer agreements with a number of globally recognised food, beverage and nutritional product companies for the evaluation of the product.

Clarisoy is a unique soy protein isolate that is 100% soluble, remains completely transparent and exhibits low viscosity in



Burcon NutraScience's Clarisoy soy protein isolate enables the protein-fortification of many different sports drinks, juices, waters and beverages. Here, three global brand sports drinks (the orange, red and blue bottles) and two vitamin waters each contain 2% Clarisoy soy protein, yet they are still transparent. Among its attributes, Clarisoy is 100% soluble and transparent in acidic beverages and solutions, enabling applications down to pH 2.5, a characteristic that enables the inclusion of protein in many different acidic fruit juices and sports drinks. It also has exceptional flavour characteristics (no “beany” taste) and is heat-stable permitting hot-fill applications in beverage production. Clarisoy has numerous applications as a protein ingredient in many different foods and beverages and is an advance over traditional soy protein isolates in the multi-billion-dollar global soy protein market.

acidic solutions over the pH range from 2.5 to 4.2. Therefore, the product is highly suitable for use in virtually all types of acidic beverages. Solutions of Clarisoy at low pH are also heat-stable, allowing thermal processing of ready-to-drink acidic beverages (such as hot fill) with no loss of clarity or notable viscosity change. Given the complete solubility of the soy protein isolate, it is not necessary to employ the use of other ingredients to assist in keeping the protein suspended or in solution. In its dry form, the product is a lightly coloured powder and it produces solutions with little colour. It also has no off-odours or off-flavours, with the flavour having been described as noticeably less “beany” than conventional soy protein isolates. Nutritionally, Clarisoy is comparable to other commercial soy protein isolates that are considered complete proteins. As is typical for commercial soy isolates, no detectable flatulence-promoting oligosaccharides are found in the product. The process for manufacture is believed to work equally well for genetically modified or non-GMO soy.

Apart from its potential in ready-to-drink acidic beverages, Clarisoy can also be used to fortify acid-powdered beverage mixes. Powdered drink mixes is a growing product category,

Soy protein isolates: Clear advantages

Protein fortification of beverages with soy protein isolates offers certain advantages over the use of whey protein isolates. One major factor is the cost: Plant proteins are typically less expensive to produce than animal proteins. Also, fortification of beverages with soy protein would allow the potential advertisement of the soy protein heart health claims mentioned previously. Beverages containing soy protein would also be suitable for people allergic to milk, lactose-intolerant, or those people choosing not to consume animal-derived products. Protein fortification of beverages is a convenient means of offering consumers nutritional value and other specific benefits; these factors also work to the benefit of food marketers. The development of proteins that are soluble, transparent and heat-stable in acidic solutions should open up the market for acidic beverages containing protein. **FBA**

This article, which first ran in Food Engineering & Ingredients April/May 2009, is written by Mr Kevin Segall (PhD) – a food scientist from Burcon NutraScience Corporation.



particularly with the proliferation of single-serving portion packs that can be added to a bottle of water. The variety of powdered beverages available has also grown, and now includes sports drink mixes, energy drink mixes and nutrient-enhanced drink mixes. Protein fortification of powdered drink mixes offers all the same benefits as the fortification of ready-to-drink beverages.

Soy transformed into a high-quality protein ingredient that is 100% soluble and transparent in acidic beverages with no beany taste.