

**F**UNCTIONAL beverages featuring both a health benefit and good taste have become more and more popular over recent years. A wide range of beverages have been formulated as being functional beverages, these include bottled water, juices, soymilk and other health drinks enriched with nutraceuticals.

Juices were one of the first beverages that have been fortified. In the United States, calcium enriched orange juice has a 25% share of the US\$2 billion a year orange juice segment. In Asia this beverage segment is also seeing strong interest and there are several opportunities for calcium and mineral fortification.

The bottled water market is expanding across the world, driven by the universally-recognised message of the importance of drinking 8 glasses of water a day, coupled with convenience, portability and an intrinsically healthy image. Fortified bottled water, also known as Enhanced Water or Near Water, can build on the success of bottled water, providing consumers something new that will make them feel better.

In the United States, the number of new enhanced water products, fortified with minerals and vitamins, has significantly climbed over the past few years and sales accordingly grew at a very fast rate. A large number of enhanced waters are fortified with calcium. In Asia the market lags the US somewhat, but the trend is clearly there.

## A Clear Choice: Calcium Salts for Juices & Bottled Water

In formulating calcium-fortified bottled waters and fruit juice products, the calcium source should be neutral tasting, highly soluble and highly bioavailable. Lactate and lactate gluconate salts meet these criteria, allowing beverage companies to ride the functional food wave with drinks that both nourish and refresh.

By Beh Kok Wei



### Calcium in fortified beverages

In order to develop a successful fortified juice or enhanced bottled water concept, product developers must keep in mind that consumers need to be able to accept the added ingredient. They must also understand the health benefit provided by the ingredient and at the same time there should not be any negative impact on taste.

Calcium is a well-known healthy ingredient. Its function includes building strong bones and teeth. The incorporation of calcium in beverages like drinking water and juice, provides consumers an alternative source of calcium. This is especially interesting for a large population in Asia who are lactose intolerant and therefore do not consume milk, a traditional source of calcium.

Solubility, bioavailability and flavour impact are key factors for product developers to consider when selecting an ap-

Mineral	Source		
	Lactates	Lactate gluconates	Gluconates
Calcium	PURACAL PP	PURACAL XP range	GLUCONAL CA
Magnesium	PURAMEX MG		GLUCONAL MG
Zinc	PURAMEX ZN		GLUCONAL ZN
Iron	PURAMEX FE		GLUCONAL FE
Potassium	PURASAL P		GLUCONAL K

appropriate calcium source for addition into functional beverages.

### Natural calcium sources

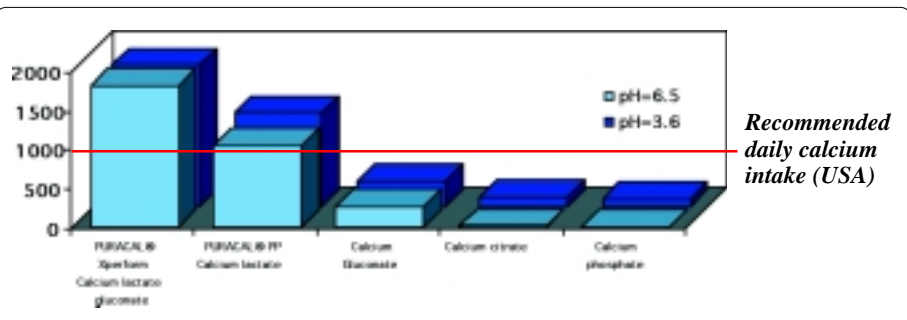
Lactates and gluconates offer beverage manufacturers natural and easy to process platforms for fortifying their products with calcium and other minerals. A broad range of options (see table on previous page) is available from PURACAL, giving product developers a variety of possibilities for creating added value beverages.

The PURACAL range offers natural calcium sources based on lactate and gluconate. PURACAL is used for calcium fortification of many healthy products such as fruit juices, waters, sport & health drinks, soymilk, dairy products and diet & baby foods.

### Solubility

The solubility of a calcium source is of utmost importance when incorporating calcium into beverages. PURACAL calcium L-lactate and calcium lactate gluconates are highly soluble calcium sources. Their excellent solubility at a wide pH range makes them the calcium of choice for fortification of beverages (see graph above). Both PURACAL calcium lactate and calcium lactate gluconate dissolve faster compared to substitutes.

The extremely fast dissolution rate of PURACAL Xperform (formerly Gluconal CAL) calcium lactate gluconate is especially advantageous when processing at



*The neutral taste and mouthfeel of calcium lactate gluconate lend well to its application in the growing fortified bottled water segment.*

low temperatures and during in-line blending.

### Bioavailability and taste

An in vivo bioavailability study has shown that calcium lactate gluconate has the highest bioavailability. While calcium L-lactate is as well absorbed by the body as milk calcium, calcium phosphate was the least bioavailable (see graph below).

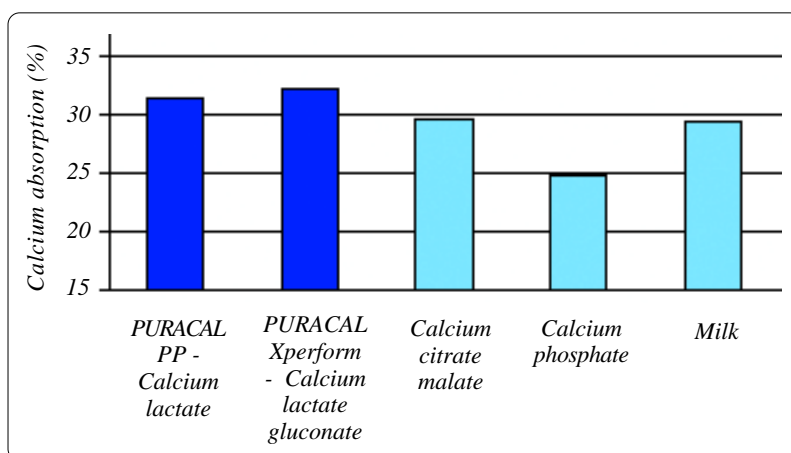
PURACAL calcium L-lactate and calcium lactate gluconate are considered to be the most neutral tasting of the calcium salts and thereby ideal for applications in

delicately flavoured beverages like enhanced bottled water and juices. PURACAL also fits well with the flavour of dairy and soy-based drinks.

Other calcium salts may be perceived as having a bitter, soapy, tart or acidic taste. Some calcium salts have a bland taste but give a gritty mouthfeel due to their poor solubility. Dairy based calcium imparts some dairy notes associated with milk or milk proteins favourable for dairy beverages but which are not desirable for juices. Besides that, dairy based calcium sources generally have a low solubility.

In conclusion, PURACAL PP is shown to be most suitable for calcium fortification in juices, while PURACAL Xperform's extremely fast dissolution rates makes it ideal for enhanced bottled water.

Enquiry No: 021



*Beh Kok Wei is Market Development Specialist at Purac Asia Pacific. For more information, phone +65 6349 1350, email pap@purac.com or visit www.purac.com. PURACAL, PURASAL, PURAMEX and GLUCONAL are registered trademarks of PURAC.*