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Flavour-matching creates new taste experiences

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EDITORIAL

Dear Readers,

One of the potential hazards when dealing with beverages is that they are rarely non-perishable but their properties can be altered and flavor or functionalization can degrade over time. This hazard is especially critical for so called 'sensitive drinks'. Under this term Corvaglia summarizes beverages like dairy products, teas, juices, sports drinks, flavored waters as well as alcoholic beverages. Read more how a company specializing in providing technologies for soft drink closure solutions, is prepared to avoid penetration of particles or other matter into the bottle (p. 118).

For food and drinks manufacturers the creative use of ingredients offers all kinds of possibilities to create products specifically targeted at younger generations. Millennials are part of that group. And so is the group of the subsequent Generation Z, who were born from 1997 onwards and already make up around 25 per cent of the world's population. By 2020, this figure will be 40 per cent. All the more reason why their food preferences play an immense role for the food industry. Is foodpairing the solution to attract the Generation Z? Read more as of page 121.

A waste-to-energy project undertaken by the world's largest integrated pineapple operation, Del Monte Philippines Inc. (DMPI), has exceeded even the high effluent quality targets originally set for the job. How to harvest free green energy from food process water is described as of page 124.

Looking at the history of our fruit and juices industry we had a bundle of important changes that are remembered as 'revolutions'. These changes are linked to processing, machinery, technology, products, credit, cooperatives, labor, water, irrigation, genetics, environment, among others had their chance to write down their names in several moments of the fruit processing industry and the juice chain. Read more about how to cope with the information revolution in the juice business and the challenges involved for juice manufacturers on page 126.

For those who have not yet been subscribed to FRUIT PROCESSING we recommend the key point paper on raw materials retrieved from our archives and still worthwhile reading.

We wish you an interesting and instructive reading!



Yours,

M. Beich

Please note: FRUIT PROCESSING is moving from 6-issue print format per year to 11-Issue print plus digital format per year. More information on the back cover page.

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Dr Michael Krüger

Caps and closures for sensitive soft drinks 118



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Cauliflower with cocoa, sweet mousse with dill and roasted onions, beef with popcorn – does not work? Yes, it does work. And it works very well – at least, for anyone who is open to new taste experiences with a ‘wow!’ effect. Foodpairing is the method of combining ingredients with a similar flavour structure. The result is often combinations which at first glance seem unusual, but harmonise perfectly and sometimes take you by surprise...



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The dissemination of specialised information by the media in the XXI century has contributed to the establishment of a socially critical attitude on the part of consumers, which has translated into a search for good quality products with an emphasis on food and drink. This sector has understood the value of marketing and increased the supply of innovative products that are not only attractively priced but also appeal to personal concerns such as the promotion of health and social welfare. Consumers are aware, organised and well advised and do not seem to be overly worried about the price of such products...



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Caps and closures for sensitive soft drinks

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One of the potential hazards when dealing with beverages is that they are rarely non-perishable but their properties can be altered and flavor or functionalization can degrade over time. This hazard is especially critical for so called ‘sensitive drinks’. Under this term we summarize beverages like dairy products, teas, juices, sports drinks, flavored waters as well as alcoholic beverages, although we at corvaglia do not focus on the latter.

Drinks can be affected and spoilt by external influences like light, temperature, oxygen or micro-organisms only to name a few. It is quite clear that the by far most amount of light or heat will enter through the bottle and not through the closure. So as a company specializing in providing technologies for soft drink closure solutions, our primary goal has to be to avoid penetration of particles or other matter into the bottle in any circumstance.

What do we mean by ‘in any circumstance’? To account for their sensitivity (i.e. risk of being spoilt), sensitive drinks are usually pre-treated and/or bottled using a filling method that either creates or maintains sterility of the content of the bottle in order to increase shelf-life of the drinks by killing eventual micro-organisms. Both, pre-treatments and filling procedures affect the performance of the package. Hence the package design has to take these effects into account.

Table 1 summarizes some of the treatment types typically used prior to filling to sterilize or clean beverages.

Similarly, filling processes can create exactly the same challenges as pre-treatments since the same methods of sterilization are used for both (cf. table 2). Obviously, challenges can vary significantly for the same treatment or filling types depending on implementation. For instance, whether an aseptic cold filling is done ‘dry’ or ‘wet’, dipped into a bath or sprayed on the product can make a difference: for dry aseptic procedures where hydrogen peroxide steam is used for sterilization, the temperature of the closures can still be as high as 45 °C when arriving at the chuck. This changes elasticity and consequently its capping behavior. Using wet aseptic procedures, closures arrive at the capping chuck with a lower temperature.

When designing a package or closure, one mainly has to take into account effects of temperature and chemical treatments. The former can for instance change the sealing performance by changing the material properties. The risk associated to the latter is a degraded organoleptic performance and may also lead to a need to eliminate pockets, dead volumes or similar traps for deployed chemicals. Radiation can be an obstacle as well, since depending on energy and intensity, electro-magnetic radiation can lead to changes of the inherent material properties, e.g. by cross-linking of polymer chains. An overview of potential hazards per treatment type can be found in table 3.

The main difference between the effects of pre-treatments and the effect of filling methods on the packaging is that the former risks are just carried over from the pre-treat-

Table 1: Examples of treatment types that can be used prior to filling in order to sterilize or clean beverages. UHT = Ultra high treatment; UHP = Ultra high pressure; UV = Ultraviolet radiation; GAC = Granular activated carbon.

Temperature	Radiation	Filtration	Pressure	Chemicals
Pasteurization	Magnetic pulsation	5µ, 1µ, 0.2µ	UHP	Ozonation
UHT	UV	Reverse osmosis		Sulfuration
	Electron beam	GAC		Preserving agents
Ultrasonic pasteurization		Multimedia filtration		
	Electron beam			

PACKAGING

Table 2: Examples of filling processes that can be used to sterilize beverages or maintain sterility. UV = Ultraviolet radiation.

Temperature	Radiation	Filtration	Pressure	Chemicals
Hot fill	Plasma	-	-	Addition of preservatives (e.g. E242 'Velcorin')
Tunnel pasteurization	UV			Aseptic cold fill

ment whereas the latter risks are applied directly to the package. For example, beverages treated by a UHT process are usually cooled down significantly from the initial up to 150 °C (1) once packaged, whereas the heat applied from tunnel pasteurization acts directly on the package.

Beverage packaging is a high volume business which is a reason why standardization is a very helpful tool within the industry. There is no doubt that standardization allowed for fast development cycles and lead times since one could rely on an 1881 neck being an 1881 neck for instance. But the idea of standardization has its limits. In the early days of PET necks it seemed like a good idea to take neck designs used for glass bottles and use them one-to-one for the plastic bottles. These neck designs have proved to work well for ages. But obviously plastic and glass are significantly different materials. Having the treatments types from above in mind, it becomes immediately clear that e.g. resistivity against high temperatures has never been a problem with glass bottles while for plastic bottles this can very well be the case.

Let us take a 38 mm neck finish for aseptic cold fill (ACF) applications as an example of issues with a one-to-one adoption of glass necks. Bottles with 38 mm ACF necks and closures are usually used as packages for sensitive beverages. The 38 mm neck finishes and corresponding closure designs in the market are certainly economical (i.e. light-weight) solutions. However, the combination of these necks and closures do not create a very stable pack-

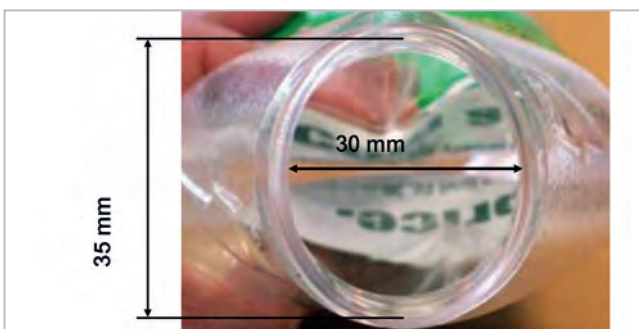


Fig. 1: Bottle with a 38 mm neck finish (inner bore diameter of 33.4 mm), pinched at the middle part, leading to severe ovalization of the neck.
© all photos corvaglia

Table 3: Potential hazards associated with pre-treatment types and filling procedures that have to be accounted for when designing closures.

Temperature	Radiation	Filtration	Pressure	Chemicals
Change of material properties	Change of inherent material properties	-	-	Change of organoleptic properties
Change of shapes of packages				Remains of treatment chemicals

aging, especially against high temperatures, but also already at room temperature. This can be visualized when pinching a bottle with a 38 mm ACF neck finish leading to severe ovalization (c.f. fig. 1).

Let us now compare the situation of the 38 mm neck finish to a 26 mm neck finish customized by corvaglia which was clearly designed for flat water applications, i.e. a lot less critical in terms of sensitivity of content than the 38 mm finish we compare it to.

We use the ratio of wall thickness (WT) to inner bore diameter (IBD) as a measure for the stability of the neck. Comparing this ratio for the above mentioned closures, we arrive at a much more favorable ratio for the flat water neck finish than for the sensitive beverage neck finish. The difference, as depicted in Fig. 2 is roughly 40%! In other words, the most expensive and sensitive drinks today are shipped in the cheapest packaging available.

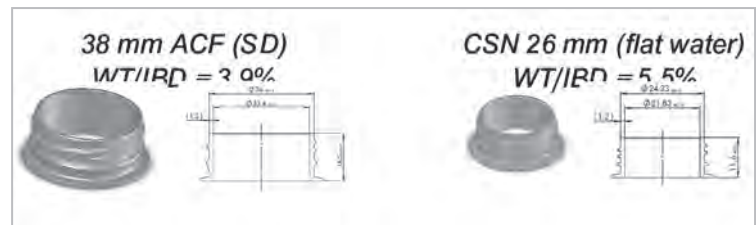


Fig. 2: **Left:** 38 mm neck finish for aseptic cold fill applications as used for sensitive drinks (SD). The wall thickness (WT) is 1.3 mm, the inner bore diameter (IBD) is 33.4 mm resulting in a ratio of 3.9%. **Right:** Corvaglia Short Neck (CSN) 26 mm neck finish for flat water applications. The wall thickness (WT) is 1.2 mm, the inner bore diameter (IBD) is 21.8 mm resulting in a ratio of 5.5%.

Additionally, for packages as instable as the 38 mm ACF example, a safe packaging is only created by the mutual stabilization of closure and neck in a tightly screwed state. Once partly unscrewed, this stability is lost and product safety of a sensitive drink can no longer be guaranteed.

Another interesting point to note is the fact that these 'weak' necks are better stabilized by one-piece than by two-piece closures. The reason for this is that the liner in two-piece closures only acts from above the neck, providing no horizontal guidance, whereas common one-piece closures do provide this guidance.

Now what happens if the tight combination between closure and neck is loosened? For the sealing parts of the closure we are talking about rather small HDPE components, where rather small temperature variations resulting in small dimensional changes can have a rather large effect on the sealing behavior in such a delicate stabilizing combination.

Sidel (2) has proposed a qualification test for packages filled under aseptic conditions where half of the samples under evaluation are partly unscrewed leading to a breach of the package's stabilization. The test contains temperature cycles that are run to simulate filling and real-life conditions of the package. The combination of a 'weak' package like the 38 mm ACF neck, breaching the stabilizing effect of a tightly screwed situation and running temperature cycles with it poses a huge challenge to design a closure maintaining the sealing performance of packages for sensitive drinks 'in any circumstance'. We have taken on this challenge in cooperation with the Zurich University of Applied Sciences (ZHAW) Institute of food and beverage innovation (ILGI) to improve current closure designs in order to guarantee product safety even under the worst conditions. All new generations of corvaglia closure designs incorporate the findings we have gathered during this process.

In summary, the most sensitive beverages are shipped in the cheapest and most critical packaging today. For this kind of packages the stability can only be guaranteed when neck and closure are tightly screwed together, partial unscrewing leads to a breach of stability. Currently there is work underway at corvaglia to master even this challenge.

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corvaglia in brief

corvaglia is a family-owned provider of closure systems for PET bottles. As a successful and innovative supplier to the beverage industry, corvaglia sets global standards when it comes to plastic closures. Over a period of two decades, a company group with some 260 employees, two sites and a worldwide network of partners in over 15 countries was established, which now includes renowned multinational conglomerates among its customers. In addition to innovation and pioneering spirit, corvaglia's strength lies in its fully integrated process chain – from creation to fitting on the bottle: closure design and development (think caps) mould design and manufacturing (shape caps) closure production (make caps) as well as application and technical support (apply caps).

Every efficient solution for a good closure system relies on just the right concept. corvaglia will be glad to advise you right from the outset of your product development process – corvaglia can support you with the design of your closures, so that they will complement your bottle design perfectly and lower your raw material costs. The offer you specialised expertise down to the smallest detail, and provide helpful assistance every step along the way, straight through to the training of your employees.

corvaglia are keenly aware of the intense competition in the beverage sector, so they also know that bottlers demand reliable cap supply at the lowest cost. These beverage closures must be precisely matched to the different requirements of the beverages, no matter whether it involves a juice closure, a still mineral water closure, or a carbonated soft drink closure.

Foodpairing: A key to Generation Z

The chemistry must be right: flavour-matching creates new taste experiences

| Flavour-matching | Flavour Trees | Foodpairing | Taste Experience |

Cauliflower with cocoa, sweet mousse with dill and roasted onions, beef with popcorn – does not work? Yes, it does work. And it works very well – at least, for anyone who is open to new taste experiences with a ‘wow!’ effect. Foodpairing is the method of combining ingredients with a similar flavour structure. The result is often combinations which at first glance seem unusual, but harmonise perfectly and sometimes take you by surprise.

Foodpairing is based on the precise analysis of foods, to identify their respective aroma structure – all the volatile substances that are experienced with the nose and mouth. 80 per cent of what we commonly associate with the ‘taste experience’ is determined by precisely those aromas, and only 20 per cent is what we actually taste and the texture we feel. The aroma spectrum can be analysed with gas chromatography, which measures the gaseous compo-

nents of food. Once the flavour spectrum of a food is documented, counterparts with similar flavours can be found. Specialists with portals such as ‘Foodpairing.com’ make it easy to research ‘flavour matching’. On the website, the most important flavour characteristics of many foods and beverages are held in a database. With a few clicks, so-called ‘flavour trees’ can be created, showing what foods are closely related in terms of flavour, and therefore harmonise particularly well.

My Siïo Lê, Global Product Manager at SIG Combibloc: “Foodpairing provides product relationships that are unaffected by cultural or historically evolved backgrounds. In the analysis of foods, with food pairing the aroma structure alone is decisive. Well-known examples of pairings are, for instance, ‘surf and turf’ variants, in which seafood and red meat are brought together in a single dish, or the



An unusual combination – but because of the aroma structure, it goes perfectly: rum, beetroot, raspberry, chocolate and olive.

(all photos © Foodpairing®)

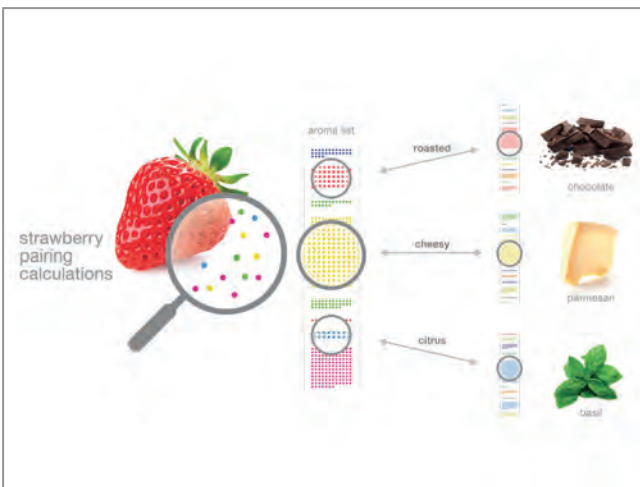
combination of pears, beans and bacon in a classic dish from northern Germany. Such supposedly disparate pairs create a rather effective whole. With the method of food-pairing, there's a scientific basis for such matches, from which countless exciting combinations can be created".

'Z' in their sights

For food manufacturers too, the creative use of ingredients offers all kinds of possibilities to create products specifically targeted at generations that are growing up with multicultural influences and ideally develop an open-minded approach to the possibilities of diversity – including where the choice of foods and beverages is concerned. Millennials are part of that group. And so is the group of the subsequent Generation Z, who were born from 1997 onwards and already make up around 25 per cent of the world's population. By 2020, this figure will be 40 per cent. All the more reason why their food preferences play an immense role for the food industry.



My Siūo Lê: "If you look at the food preferences of Generation Z, there are two meta-trends that really stand out: sustainability and individualism. The generation consciously cares about sustainable production, and it wants individual opportunities to consume a varied diet – at affordable prices. Taste experiences appealing to different senses are more in demand now than ever. In times when lifestyle diseases such as obesity, type 2 diabetes and hypertension are a huge problem, Gen Z is a ray of hope for a healthier lifestyle. The generation is very digitally networked; global exchange with other people isn't the exception, it's the rule – including when it comes to health questions. There



A strawberry contains several dozen different flavours. However, only a few of the flavours stand out clearly and give us that precise strawberry smell. The team from Foodpairing® has defined algorithms which can be used to calculate how well foods and beverages go together.

are more health and fitness apps, food blogs and portals than ever before. And there are always new ones coming along that could be the key to healthier living".

Johan Langenbick, co-founder and business developer at the Foodpairing® Company based in Bruges, Belgium, is also enthusiastic about the opportunities afforded by the intelligent, scientifically substantiated combining of ingredients according to flavour affinity, for everyone who is creative with food and beverages – professionally or privately.



Johan Langenbick, co-founder and business developer at the Foodpairing® Company.

The Foodpairing company was founded in 2009 by scientist Bernard Lahousse, top chef Peter Coucquyt and Johan Langenbick. Based on the core areas of market research and information technology, Foodpairing identifies flavour combinations that go down well with consumers and can help make food more exciting, and healthier at the same time. Johan Langenbick: "People's palates have become more refined. Today, people eat much more passionately and adventurously than they used to. That also creates great opportunities for chefs and brands. We believe Foodpairing can help improve quality of life. We see our goal as developing tools to make people happier about



The chemistry is right: According to the Foodpairing criteria, in addition to chocolate and coffee, perfect companions for the strawberry are parmesan, mussels, tomatoes, pepper and pumpkins.

cooking and nutrition”. Food experts from more than 125 countries are already registered with Foodpairing.com and becoming inspired by suggested combinations and recipe ideas.

My Siüo Lê from SIG Combibloc: “Food manufacturers face the challenge of meeting the tastes of the consumer – in line with the latest trends, contemporary, reasonably priced and as far as possible, right first time. Creative flavour matching could be a key to meeting the individuality and sustainability demands of Generation Z”.

Brief interview with Bernard Lahousse, scientist and co-founder at the Foodpairing® Company:



Bernard Lahousse, scientist and co-founder at the Foodpairing® Company.

Bernard Lahousse, quite a personal question: Which unusual food pairing should one try just to get started?

Lahousse: The first Foodpairing combination ever created in a cooperation with chefs, back in the days we were testing and developing the Foodpairing methodology, was a combination created by Belgian chef Sanhoon Degeimbre: “Le Kiwuître” – a combination of kiwi fruit and oyster. They share fresh, greenish aromas in common and are true match.

Which pairing could Generation Z like? And why?

Lahousse: Generation Z is less and less bound by cultural habits. Being a generation that is growing up with global tourism, access to any type of food information online, and the accessibility of ingredients from all over the world, this generation is experimental and adventurous. They are very much open to try new ingredients and dishes. We see that new ingredient trends are picked up very quickly by this generation. This translates itself into the fast growing market of for example plant-based beverages (coconut water, cactus water, almond drink, and so on).



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What about milk drinks a bit different from the usual strawberry, chocolate or vanilla flavours? Apart from those, what do you think goes perfectly with milk?

Lahousse: The aroma profile of milk is very diverse and lends itself to many possible-matching opportunities. It contains cheesy, green and fruity notes. That’s why it matches with a great variety of fruits and many other ingredients. Milk can be combined, not only with fruits, but also with vegetables, such as carrots. That is because they have similar citrus notes, orange-like, and similar floral-rose aromas. But also pumpkin or asparagus could be matched to milk. What about a milk drink with strawberries and asparagus? This could be a harmonious combination of dairy, vegetables and fruits.

What could be a surprise with juice?

Lahousse: I personally love the combination of raspberry and tomato; they have a lot of flavour components in common. But the combinations for juices are actually endless. The foodpairing website helps you to think outside the box and triggers you to combine not only fruits, but also to include herbs, spices, vegetables, nuts, etc.



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Environmental overachievers

Del Monte Philippines Inc. harvest free green energy from food process water

| Del Monte Philippines | Global Water Engineering | Process Water | Waste-to-Energy Project |

A waste-to-energy project undertaken by the world's largest integrated pineapple operation, Del Monte Philippines Inc. (DMPI), has exceeded even the high effluent quality targets originally set for the job.

The Global Water Engineering (GWE) wastewater treatment installation at the Cagayan de Oro pineapple canning plant has achieved 93 percent organic pollution (COD) removal in its anaerobic reactors, producing in the process enough green energy (methane rich biogas) to power two 1.4 MW generating electrical power generator units or gensets. The effluent of the anaerobic digestion step is further polished in an activated sludge type final treatment step to satisfy the local DENR discharge effluent standards.

DMPI – which accounts for about 10 per cent of the world's annual production of processed pineapple products – will benefit from environmentally clean electricity to replace

fossil fuels typically used in electrical power plants. And the waste heat from the gensets is also put to use to heat up steam boiler feed water, which is a further reduction of fossil fuel use in the factory, says GWE Chairman and CEO Mr Jean-Pierre Ombregt.

DMPI processes more than 700,000 tons of pineapple and papaya a year to produce more than 100 food and vegetable variants. DMPI is owned by Del Monte Pacific Ltd (DMPL), who also owns Del Monte Foods Inc., the company that owns the Del Monte brand in the USA. DMPI is one of the largest producers, distributors and marketers of premium quality, branded food products for the US retail market through its affiliate DMFI, as well as private label products.

Benefits of the company's new wastewater and green energy plant mean that DMPI can replace fossil fuels with green energy, and given the high prices of electricity form



Green energy generators powered by biogas (methane) from waste water at Del Monte Philippines transform a problem into to a profit.

© all photos globalwaterengineering

the Grid and the sometimes erratic supply, the plant will achieve rapid ROI payback. Generally this takes only 2 to 5 years, says Mr Ombregt, whose company has installed more than 150 waste-to-green energy plants worldwide and ca. 400 high quality industrial wastewater and waste treatment plants, the benefits of which are applicable to any manufacturing operation with one or more organically loaded wastewater and waste streams.

“The DMPI plant has substantially exceeded even the high environmental goals set by the company for the treating more than 13,000 cubic metres a day of wastewater, or nearly five million cubic metres a year.”

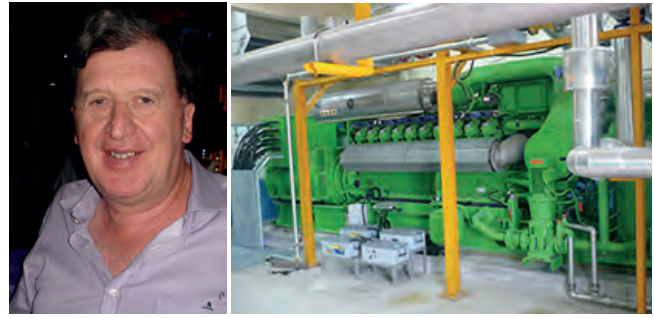
“Process results are substantially better than the guaranteed levels of the project, with anaerobic effluent achieving ca. 40 mg/l COD (93 percent removal) and final effluent achieving 70 mg/l COD, or a further 83 percent removal.”

“This is remarkable in an operation so large and a compliment to the foresight of DMPI. In terms of the positive environmental impact and the virtually free electricity gains going straight to the bottom line, this is an exemplary project for food, beverage and agribusiness processors worldwide.”

Elements of the GWE process tailored to the needs of the DMPI include:

- Pre-treatment of flume wastewater for large solids and sand removal before joining with the rest of the effluents which pass a primary clarifier.
- Anaerobic digestion in four ANUBIX™ B (UASB type) methane reactors of a type proven globally for low-to-medium strength mainly soluble carbohydrate containing effluents, attaining outstanding COD removal efficiencies, in some cases even up to 99 %
- Aerobic activated sludge type polishing treatment of the anaerobic reactor effluent (upgrade of existing facilities)
- Mechanical sludge dewatering of the aerobic excess sludge (by reuse of existing facilities)
- Biogas sweetening in a 2 step (physico-chemical followed by biological) SULFURIX™, BIOSULFURIX™ process for sulphur removal, followed by GASODRIX™ biogas drying
- Feed of the sweetened and dried biogas to the 2 electricity generation sets

GWE anaerobic technologies have been successfully deployed on diverse organic and agribusiness waste streams produced by industries including food and beverage processing, starch and fermentation industry, pulp & paper and many other type of agro-industry.



GWE Chairman and CEO Mr Jean Pierre Ombregt whose green energy technology has achieved global acceptance.

Their success was recognised by GWE’s successful entry in the 2014 IChemE award for the best project or process to demonstrate innovation in renewable energy, alternative energy sources, efficient energy use or the development of energy production methods that reduce energy and water intensity.

The winning entry involved pulp processing at the Chok Chai Starch cassava processing plant in Thailand. The Institution of Chemical Engineers (IChemE) is the global professional institution for chemical and process engineers with 40,000 members across 120 countries.

“Biogas from waste water is an outstanding source of base load power. As part of a renewable energy mix – complementing wind and solar generation, for example – electricity generated with biogas is highly reliable and consistent.”

“As the major component of natural gas, methane is an environmentally attractive alternative to fossil fuels,” said Mr Ombregt, whose company was complimented by DMPI on achieving better than guaranteed process results.

DMPI also complimented GWE on the quality of equipment supplied and workmanship in construction and installation, as well as professionalism of operational supervision. GWE was subsequently awarded a supervision contract extending until 2017 to optimise plant operation.

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The information revolution in the juice business

| Information Revolution | Juice Chain | Tracing Information | Use Of Data |

Looking at the history of our fruit and juices industry we had a bundle of important changes that are remembered as... revolutions. These changes are linked to processing, machinery, technology, products, credit, cooperatives, labor, water, irrigation, genetics, environment, among others had their chance to write down their names in several moments of the fruit processing industry and the juice chain.

If we can point one that at this moment is challenging our businesses is related to data and will also leave its name in the history of the juice chain. New technologies allow us to have data being generated in almost all moments, by several different sources, and if we have the capacity to transform this data into good information, several opportunities will emerge creating winners in the food and juice business. It is a race for the future of data generation and use of information, and no juice company can stay out of this process.

In this article, I separated the data revolution issue in the food and juice industry in three parts, being the sources of data (1), the processing of data into information (2) and the use of information (3).

The sources of data

Comparing our lives and our decisions now and ten years ago, we can easily perceive new sources of data registers, based in a much bigger use of technology in our activities. Data that can be used in food and juice industries are being constantly generated in:

- Consumption of juices, beverages and other products;
- Financial transactions, credits, assets, liabilities in Banks and other financial institutions;
- Product and services purchase transactions;
- Credit and debit cards usage and personal data;
- Traffic of cars, tractors, combines and others, tolls and GPS information;
- Interpersonal cooperation (as an example, Waze and other applications/systems)
- Millions of sensors (speed, temperature, traffic, weight, size);

- Hash tags, tweets and other movements;
- Images and videos (uploads and downloads);
- Website page views, comments, likes, dislikes and others;
- Mobile phone traffic and usage;
- Tracing information (traceability) from the supply chain (bar codes);
- QR codes accesses;
- Physical and virtual memberships, communities and clubs;
- TVs, computers and other devices tracking information;
- Insurances and other services (health, home, cargo);
- Drones, satellites, images and others;
- Weather, rain, temperatures...

These are just some examples of sources of billions of data being generated now. Much of these weren't available some years ago, and now are on our hands. So the idea here in this first part, is to have access to data. If you have access to data, you are one step ahead.

The processing of data into information

The second topic is the capacity an organization (in our case, juice industry) has to filter, to select, to process, to aggregate and analyze, transforming the billions of data coming from very different sources in relevant information for the structuring of the decision process. How to do it is the big question that is joining an interdisciplinary team of specialists in systems, in strategy, in data mining. It is a challenge of organization!

The use of information

Finally, we come to the third topic that brings the opportunities to use all this data transformed in information for an organization (juice industry). Several opportunities emerge that will allow improvements that can be captured by the first movers bringing competitive advantage:

- More efficiency in targeting marketing efforts, as for new product and new service developments, communications and others;

- Increase controls in the production processes and as a consequence, productivity;
- These controls will allow better and anticipated diagnosis of bottlenecks;
- Economy of resources (supply, fruits, fertilizers, chemicals, seeds and others) via a much more precise supply chain. We can even think about “zero waste” supply chain going all the way to agriculture.
- More information allowing improvements in inter-firm cooperation and linkages;
- Improvement in all types of projections;
- Anticipation of macro-environmental impacts, with better and previous signaling;
- More controls allowing for very efficient just-in-time operations, with less stocks and better management of inventories;
- With more information and more monitoring, we can have a learning curve acceleration, reducing costs for the juice industry;
- More efficiency in use of machinery;
- Improve capacity of price monitoring and dealing with volatility in futures markets;
- Information can also improve efficiency in buying resources needed for the production of the juice industry;
- Better decisions can be taken with more information available;

The challenges for the juice and other food organizations are in all three parts of this article.

- 1 How do we build access to data?
- 2 How do we filter and process data into relevant information?
- 3 How to use this information as a source for a continuous search of competitive advantage?

If you take a look to the mobile phone sitting beside your newspaper (do you still read a printed version) or your computer now, or the one that you are using to read this story and imagine how did it look like ten years ago and how many industries it substituted allowing you to do several activities in just one device, imagine what will happen with all this information available for food and juice industry decision makers. Another revolution... Be prepared!

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Some fruits with specific healthy appeal*

| Fruit Sugar | Healthy | Raw Material | Superfruits |

New paradigms

The dissemination of specialised information by the media in the XXI century has contributed to the establishment of a socially critical attitude on the part of consumers, which has translated into a search for good quality products with an emphasis on food and drink. This sector has understood the value of marketing and increased the supply of innovative products that are not only attractively priced but also appeal to personal concerns such as the promotion of health and social welfare. Consumers are aware, organised and well advised and do not seem to be overly worried about the price of such products.

WHAT ATTRACTS CONSUMERS?

The main target for consumers is food that includes soluble compounds and dietary fibre in order to establish a well-balanced diet, whether on the advice of an expert in the field or not. The hedonic approach is still very common and in the case of fruit it starts with the appearance, which is an important factor in the decision to purchase, and the flavour, which defines the implementation of the habit of consumption. The search for bioactive components, that give food its functional character, characterises a more sophisticated and demanding consumer.

THE APPEAL OF FUNCTIONAL FOODS

Certain age groups of consumers seek functional foods that may have some claim to improve the functioning of the digestive, cardiovascular and immune systems; which may assist in weight loss and the functioning of the joints; that also maintain healthy bones and hormonal balance; that promote relaxation and stress reduction through effective sleep, as well as a more youthful appearance. In a way, consumers are looking for foods with phytoterapeutic properties

BENEFITS TO HEALTH

In general, fruits contain components with healthy, energetic, nutritional and bioactive effects (Geus *et al*, 2011). There have been frequent reports in relation to the an-

tioxidant capacity of fruits, with variable values and mechanisms, but always mediated by carotenoids and flavonoids that are ubiquitously present in plants, mainly as secondary metabolites (Paganda Rice-Evans, 1997). The specialist literature contains information about the different methodologies applied for the measurement of the important factor of quality, and also techniques that deliver results such as FRAP or HPPH, which, with respect to Trolox, are relevant to the area of food. Some reports have suggested that the intake of flavonoid compounds which include anthocyanins may assist in the prevention of diverse morbid conditions (Scalbert, Williamson 2005, Park *et al*, 2003, Houston *et al*, 2007, Sporman 2008, Russell *et al*, 2009).

SUPERFRUITS

Some specific fruits have been differentiated and labelled as belonging to a group called 'superfruits' (Nuijten, 2010). This is still an exploratory concept, since their bioactive components are still being defined in qualitative and quantitative terms in order to be used as classification criteria. Although there still remains a question regarding the terminology, it cannot be denied that there has been an increase in information about small red fruits in the period from 2001 to 2010 (Wosiacki *et al*, 2010 Geus *et al*, 2011, Zielinski *et al*, 2012 Messias 2010).

FRUIT SUGARS

The fraction of sugar in fruit comprises the monosaccharides, fructose and glucose, which are always present, and the disaccharide, sucrose, which is not found in some fruit – all of which are determined by their genotypes. These sugars are chemically inert and can be accumulated in the cellular environment of fruit. It is only when this control situation is undone, as in the case of milling that tissue structures are disrupted and hexokinase, glucokinase and frutokinase catalyse the phosphorylation reactions that activate the sugars. The maintenance of potential redox and the action of soluble enzymes of intermediary metabolism quickly promote their disappearance and the appearance of ethanol or lactic acid, metabolically stable enough to be accumulated in the final

product of alcoholic fermentation, and lactic or anaerobic respiration, respectively. Sucrose, the disaccharide found in fruits, is also inert from the chemical point of view and needs to be hydrolysed, either for alcoholic fermentation to occur, or as to be used in the human diet. This soluble sugar is found in fruits at levels which may vary from zero to 30 % of the sugar fraction (Herrmann, 2000). Fruits that are sucrose-free or have low sucrose levels are especially recommended for people who do not have an enteral enzyme with hydrolytic activity of sucrose and isomaltose, and therefore have intestinal problems, which can range from mild to extremely severe (Guiraldes, 1975).

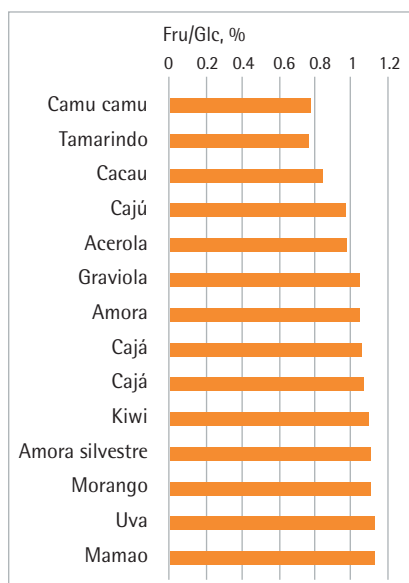


Fig. 1 Ratio distribution among the fruits

TAB: FRUCTOSE AND GLUCOSE RATIO			
Fruits	Fructose, %	Glucose, %	Ratio
Amora	51,24	48,76	1,0509
Acerola	49,29	50,71	0,9717
Blackberry	52,49	47,51	1,1047
Cacao	45,87	54,13	0,8472
Cajá	51,63	48,37	1,0672
Cashew	49,21	50,79	0,9690
Camu camu	43,58	56,42	0,7722
Soursop	50,63	48,4	1,0460
Kiwi	51,97	48,03	1,0811
Papaia	53,06	46,94	1,1302
Strawberry	52,5	47,5	1,1053
Tamarind	43,59	56,41	0,7721
Grape	53,05	46,95	1,1301

At the time of its discovery, children were identified as the main group at risk, but today it is generally accepted that the enzyme present in the intestinal lumen of adults due to mucosal peeling is enough to hydrolyse disaccharides, which explains why there are so many asymptomatic sucrose-intolerant people.

SUCROSE-FREE OR LOW SUCROSE

Some fruits have been singled out due to their low sucrose levels (as low as zero, depending on the sensitivity of the chromatographic technique) to form a group and to determine other characteristics that can be used to ensure the possibility of processing them as raw material. The fruits under consideration are known by the common names of *acerola*, blackberry or *amora*, cocoa, *cajá*, *cashew*, *camu-camu*, cherry, soursop, kiwi, papaya, strawberry, tamarind and grape. Some of these have been previously reported (Zielinski *et al*, 2012). These fruits only contain monosaccharides, in proportions similar to those shown in the following Table. Samples of juice from these fruits (industrial frozen pulp obtained locally in Curitiba PR) extracted by centrifugation (10,000 rpm/20min). The filtered juice was analysed using high performance liquid chromatography (HPLC) and the concentrations of the sugars were monitored using a refractive index detector (RI). The sensitivity and the limit of detection (LOD) of sucrose was 54.90 mg.L⁻¹ and the limit of quantification (LOQ) was 183.00 mg.L⁻¹

In these selected samples sucrose was not detected anytime but in the specialized literature it was observed the low contents reported by strawberry, blackberry, blueberry, grapes (Lee *et al*, 1970).

The amount of sugar in each sample unit is very different, and because of that the relationship between them

(the ratio Fru/Glc) was used, as that is the most logical method of comparing quality rather than quantity. The fructose/glucose ratio shown in the Figure below illustrates the degree of homogeneity that exists between the fruits and also shows that although fructose has the highest concentration in most of the fruits, when glucose is the dominant sugar the differences are greater. If the criterion of 5 % discrimination is taken into account then the *camu camu*, tamarind and cocoa fruits form a group rich in glucose, while papaya, grapes, strawberries, amora silvestre, kiwi, *amora preta* and soursop form a group rich in fructose.

COMPLEMENTARY MEDICINE

The phytotherapeutic potential of special fruit, that is now so widely-known, has not gone unnoticed among health professionals (Quast *et al*, 2011). The terms 'nutraceutical', 'functional', 'alternative', 'traditional' 'folk', 'ancient' and 'homemade' are now understood as part of a verbal repertoire of complementary medicine. This form of medicine is being strengthened by the contribution of fruit in a new area of study (Naturomy) and a new profession (Naturomy), whose training includes the manipulation of bioactive compounds.

This group of fruits formed by the criterion of absence or low levels of sucrose, have in common the fact that, when consumed, they do not irritate the intestinal surface of those who have an intolerance to one or more disaccharides. Thus, these fruits represent appropriate options for those who are intolerant to disaccharides and have the added advantage that anyone can consume them. These options are even more important if one considers the mixture or blending of two or more of these fruit juices.

SPECIAL FRUITS

CAJÁ



The *cajá* fruit (scientific name *Spondias lutea L.*) belongs to the *Anacardiaceae* family and is originally from Africa. The tree can reach 20 m in height in tropical forests and it has large, fragrant leaves. The fruit is an oval-shaped drupe with thin, smooth, yellow skin in

the final stage of ripening. The edible pulp is orange in colour, soft and bittersweet. Furthermore, the fruit is ideal for industrial use and on average it yields 56 % of pulp. After processing, the pulp is frozen and packaged. The fruit can also be used in prepared juices, nectar, jams, wines and liqueurs. These products are newcomers in the domestic market (Brazil) and the current level of production, considering the great demand, does not meet the needs of the internal market. With respect to its benefits, the leaves and branches of the *cajá* tree contain ellagic tannin, which has medicinal properties for the control of gram positive and B negative bacteria and some viruses (herpes). It is popularly used to treat diarrhoea, vomiting, and haemorrhoids (Matos, 1994).

CASHEW

The cashew fruit (scientific name *Anacardium occidentale*) is often considered to be the fruit of the cashew tree, when in fact, it is a pseudo-fruit. What is popularly referred to as a "cashew" is composed of two parts: firstly, the fruit itself, which is a nut, and secondly, its floral stalk, the pseudo, a pyriform body that is yellow, pink or red. There are about twenty known varieties of cashew, classified according to various indicators such as pulp



consistency, shape, taste and colour of the fruit (yellow, red or purple-yellow, depending on the variety). The cashew tree is native to Brazil and is found in coastal regions. It is commonly cultivated in north-eastern Brazil and can be processed into juices, honey, sweets and a form of brown sugar (*rapadura*). Because its juice fer-

ments quickly it can be distilled to produce a brandy called *cauim*. It is also used to make non-alcoholic beverages such as *cajuína*. Cashew juice is also industrialised and highly appreciated throughout the country. The fruit itself is hard and oily, better known as "cashew", whose seed is eaten (after being roasted to remove the bark) either naturally, salted or roasted with sugar. The cashew contains Vitamin C, which acts against infection, high levels of niacin that combat skin problems and iron that contributes to the formation of blood. Its dietary fibres help intestinal peristalsis. The oil of the cashew is considered to be a potent antiseptic, cleansing wounds and helping in their healing. This oil is also recommended to combat intestinal worms. Fresh cashew leaves, when cooked and placed on wounds, promote healing.

SOURSOP

The soursop (*graviola* in Portuguese, scientific name *Annona muricata L.*) is the largest and most important component of the *Annonaceae* family. It has many popular names in Brazil such as *anona de espinho*, *jaca do Pará*, *araticum manso*, *araticum grande*, *jaca de pobre*, *condessa* and *coração de rainha*. The tree originates from the Antilles, and has since spread and is nowadays found in many tropical regions. The main producer in



Latin America is Venezuela and in Brazil, the main commercial orchards are in the states of Ceará, Pernambuco and Paraíba. The fruit is large, weighing on average 1 to 4 kg and can reach 10 kg, consequently its productivity is low and it requires special care to prevent falling and consequent loss of the fruits, which deteriorate quickly. It stands out for having great marketing potential in the domestic market (Brazil) and with great potential for export. The demand for soursop is growing and can be attributed to its sensorial qualities, which allow its use for both fresh consumption, as well as use by agricultural industries, in producing pulp, juice, nectar, ice cream, jam, cream and yoghurt. With respect to its benefits, soursop is widely used in folk medicine and its preparations are recommended for various purposes such as abscess, anti-

parasitic, asthma, hypertension, soothing and anti-tumor; it is marketed in various pharmaceutical forms (powders, liquids and capsules) (LIMA, 2007). There is some exaggeration in the information available about the power of soursop to cure some types of neoplasia. However, there are studies underway to decipher what is myth and what is reality in this context (DAI *et al.*, 2011).

PAPAYA

The papaya (scientific name *Carica papaya* L.) is a member of the *Caricaceae* family and is common in tropical America. The tree can reach up to 6 meters in height and features a thin, fragile stalk with much latex. The fruit is a berry type, pear-shaped and smooth, with peel colour



ranging from green to yellow, depending on the variety, among which the *formosa* stands out. The plant requires warm weather, and it has a very important feature; it is one of the few fruit trees that has a productive phase a few months after sowing and it also produces all year (MEDEIROS; OLIVEIRA, 2007). It can be eaten fresh, or used in juices, smoothies, desserts and pulps. Brazil is the largest producer of papaya worldwide and the fruit has great growth potential for both export and the domestic market. The latex found in the papaya contains substances that are harmful to the mucous membranes, which are also used in a culinary manner as a meat tenderiser. It has a high content of papain, a proteolytic enzyme, which is used in medicine for the treatment of gastrointestinal disorders and the reabsorption of hematomas. It also has nutritional properties, is used in treatment for Parkinson's disease and research papers have indicated that substances found in the latex of the fruit of *C. candamarcensis*, (a species of papaya native to the west coast of South America) have the potential to cure different types of wounds, such as those common in patients with diabetes, bed sores (sores that appear in patients who remain bedridden or in the same position for long periods) and those caused by burns.

STRAWBERRY



The strawberry (scientific name *Fragaria vesca* L.) of the *Rosaceae* family, originated in Europe and is a small creeping plant. It is considered to be a fruit from a temperate climate and is very attractive because of its bright red colour, characteristic smell, soft texture and taste. Its distinctive taste is the result of the relationship between its levels of acidity and sugars, among which glucose, fructose and sucrose predominate. Its Vitamin C content is high - 60-70 mg 100 g of ascorbic acid (LIMA, 1999; PAZINATO, 1999). In terms of commercialization, apart from fresh consumption it is also processed by agro-industries, where the pulp is used for making yogurt, jam, jellies, pastries, and other products. The strawberry has been studied in relation to the treatment of gout, rheumatism, increased resistance to infection and anti-cancer activity; in addition its leaves have an anti-inflammatory effect. It prevents bone fragility and poor tooth formation. Furthermore, it improves tissue strength and helps to heal wounds.

TAMARIND



The tamarind (scientific name *Tamarindus indica* L.) is a fruit that grows in a cluster and has a hard, brittle, brown, pod-shaped husk, between 10 and 15 cm long. It is harvested when mature between late spring and early summer, when the seeds inside are surrounded by a thick, reddish-yellow pulp with a sweet and sour flavour. It originates from the African savannas, although it mainly grown in India. In Brazil, the fruit is consumed in the north and north-east. The flesh has a bittersweet taste

and is used in the preparation of pastries, cakes, ice cream, syrups, beverages, liqueurs, soft drinks, juice concentrates and also as a seasoning for rice, meat, fish and other foods. The seeds serve as fodder for domestic animals and when processed they are used as a stabiliser for juices and processed foods, and as gum (glue) for fabric or paper. The oil extracted from the fruit is used for food and industrial use. Tea made from tamarind pulp is recommended for the control of fever, constipation, renal pain and it has a soothing effect.

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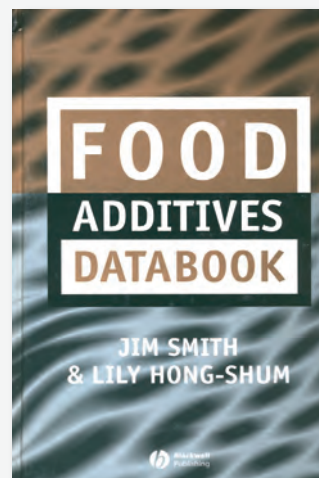
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NEW PRODUCT LAUNCHES



AUSTRALIA

Company: Bickfords
Country: Australia
Category: Iced Coffee
Event Date: March 2017
Price: USD 5.03 EUR 4.61

Description: Essence of coffee and chicory in a 550 ml pet bottle.

Claims: The original. No artificial colors or flavors. Recyclable packaging.

Ingredients: Sugar, water, chicory, coffee extract, caramel color (e150d), preservative (potassium sorbate).



AUSTRIA

Company: Fentimans
Country: AUSTRIA
Category: Carbonates
Event Date: March 2017
Price: USD 1.95 EUR 1.79

Description: Slightly sparkling fermented botanical drink with wild elderflower extract, in a glass bottle.

Claims: Natural.

Ingredients: Carbonated water, elderflower extract (9 %), sugar, citric acid, fermented ginger root extract (water, glucose syrup, pear juice concentrate, ginger root, yeast).



CANADA

Company: Campell
Country: Canada
Category: Juice & Juice Drinks
Event Date: March 2017
Price: USD 2.55 EUR 2.34

Description: A unique blend of vegetables for a delicious refreshing taste. Low sodium vegetable cocktail made with 100 % puree and juice with added ingredients. Comes in a pet bottle.

Claims: Low sodium. Made from 100 % puree and juice. 2 servings of vegetables. Recyclable packaging. Source of fiber. Source of vitamin c. High in potassium. No artificial flavors, colors or preservatives. Gluten free.

Ingredients: Vegetable puree and juice blend (water, tomato puree, concentrated vegetable juices (carrot, celery, beet, parsley, lettuce, watercress, spinach)), white grape juice from concentrate, salt flavor (potassium chloride, magnesium chloride, magnesium sulfate), salt, ascorbic acid (vitamin c), seasoning, citric acid (for tartness).



FRANCE

Company: Lidl
Country: France
Category: Juice & Juice Drinks
Event Date: March 2017
Price: USD 1.62 EUR 1.49

Description: Sparkling apple juice made from pure apple juice, in a glass bottle.

Claims: Alcohol free. Green dot certified. Coloring and preservative free.

Ingredients: Pure apple juice, carbon dioxide.



GERMANY

Company: Beckers Bester
Country: Germany
Category: Juice & Juice Drinks
Event Date: March 2017
Price: USD 3.80 EUR 2.26

Description: The sandy soils of the dutch province of limburg form ideal conditions for the rubus idaeus rheum (german name: raspberry rhubarb). The raspberry rhubarb was given its name by the characteristic coloring of its stem and by its fruity and sour taste, which becomes a special taste experience through a light raspberry note.

Claims: Alcohol free. 70 % fruit content.

Ingredients: Rhubarb fruit juice, water, sugar, elderberry juice concentrate.



JAPAN

Company: Morinaga
Country: Japan
Category: Iced Coffee
Event Date: March 2017
Price: USD 1.30 EUR 1.19

Description: Iced mocha cafe latte with orange flavor.

Claims: Spring limited. Recyclable packaging.

Ingredients: Dairy products, sugar, fructose corn syrup, coffee, cocoa, cocoa mass, dextrin, chocolate, cellulose, flavoring, emulsifier, stabilizer (carrageenan).



NEW PRODUCT LAUNCHES



KENYA

Company: Brava
Country: Kenya
Category: Carbonates
Event Date: March 2017
Price: USD 0.39 EUR 0.36

Description: Cappuccino and malt flavored non-alcoholic drink in a 300 ml pet bottle.

Claims: Certified halal. Kobs logo. Recyclable packaging.

Ingredients: Carbonated water, sugar, citric acid, caramel color, coffee cappuccino flavor, mixed fruit flavor, malt flavor, sodium benzoate e211.



NICARAGUA

Company: Yupi
Country: Nicaragua
Category: Juice & Juice Drinks
Event Date: March 2017
Price: USD 0.14 EUR 0.12

Description: Grape flavored refreshing drink in a plastic packet.

Claims: Recyclable packaging

Ingredients: Water, sugar, natural and artificial grape flavors, citric acid (acidifier), sucralose and acesulfame-k (artificial sweeteners), calcium lactate (source of calcium), ascorbic acid (vitamin c), artificial colorings: fd“ red 40 and fd“ blue 1, sodium benzoate and potassium sorbate (preservatives).



SPAIN

Company: Kallo Foods
Country: Spain
Category: Juice & Juice Drinks
Event Date: March 2017
Price: USD 1.47 EUR 1.35

Description: Organic lightly carbonated apple flavored drink made with agave syrup, comes in an aluminum can.

Claims: Recyclable packaging. Soil association organic certified. Certified carbon neutral company. Made with natural ingredients. Made with agave syrup. No artificial colors, flavors or preservatives. Contains 33 % juice

Ingredients: Sparkling water, apple juice from concentrate* (30 %), agave syrup* (6 %), lemon juice from concentrate* (3 %), natural flavorings; *certified organic.



UNITED STATES

Company: Western Family
Country: United States
Category: Juice & Juice Drinks
Event Date: March 2017
Price: USD 3.99 EUR 3.67

Description: Country style orange juice with juicy bits of oranges, in a pet bottle.

Claims: Not from concentrate. 100 % pure juice. Premium. Pasteurized. Certified kosher. Quality guaranteed. Recyclable packaging.

Ingredients: 100 % orange juice, orange juice pulp.



In cooperation with Innova Market Insights we are happy to publish new product launches on a global scale. Innova Market Insights is a world leading provider of knowledge solutions for the food and beverage industries. They serve their clients around the world with a full spectrum of solutions built around the professional needs of their individual roles.

The Innova Database is an online, cutting-edge food and beverage product database – created by a dedicated team of industry-leading food and beverage experts that collect the latest data from more than 70 countries. This allows you to instantly track trends and innovations across all food and beverage categories with just the click of a mouse. At Innova, their goal is simple – help you stay ahead of the curve.

For more details and more products please contact:

Dominik Herwald, Innova Market Insights BV; dominik@innovami.com and visit www.innovadatabase.com

Ardagh Group Launches Metal Beverage Sample Store

www.ardaghgroup.com

Unique service offers brands access to the large scale product portfolios



www.ardaghgroup.com/samplestore

Ardagh Group announced the launch of its new, metal beverage sample store. The quick and easy online platform was developed for brands as a cost effective way in which to see and touch Ardagh cans and ends prior to making a formal

commitment. By clicking through the portfolio, visitors to the site will find product descriptions/benefits, technical specifications, sustainability credentials and ordering details for the featured products. Existing customers along with brands who are considering cans for the first time are encouraged to explore the full scope of their business objectives via this innovative tool.

Products include:

- Beverage cans in a variety of available sizes
 - 50 cl format cans showcasing the extent of Ardagh's value added product applications: Variable and Premium Print; Matte, Thermo and Fluorescent Impact, Embossed and Tactile Feel as well as cans with Interactive Packaging features. In addition, Ardagh's Nitro Can and Wine Can.
 - Beverage can ends in varying colours and add-ons such as Coloured, Printed, Embossed and Incised Shells as well as Coloured, Punched, Lasered and Coded Tabs.
 - Aluminium bottles in different profiles and with Full HD print
- Access to the sample store is free of charge and allows customers to order up to three samples per product offering. Samples are typically delivered within ten working days following the placing of the order and shipped from Ardagh's plant in Braunschweig, Germany.

Evolva announces long-term commercial agreement with Cargill

www.evolva.com

EverSweet™ next-generation stevia ingredient on track for 2018 launch

Evolva announced that it has entered a major collaboration agreement with Cargill for the production and commercialisation of EverSweet™, the next-generation stevia sweetener. This product is on track for a 2018 launch, securing its first-mover advantage.

EverSweet™ is a next-generation stevia sweetener that solves both the stevia taste and Reb M & Reb D scalability challenges. EverSweet™ is brewed to produce large quantities of the most sought-after sweetness ingredients found in the stevia leaf, *Reb M* and *Reb D*. The stevia leaf contains only minute quantities of these ingredients. EverSweet™ also delivers better sweetness intensity, faster sweetness onset and improved sweetness quality – without the bitterness or off-note aftertaste common to existing stevia sweeteners. Evolva estimates the total addressable market to be worth around USD 4 billion.

Evolva will receive up to 30 % of the EverSweet™ business, determined as a function of the strain efficiencies achieved. Evolva has the right to ask Cargill to support some of Evolva's early cashflow commitments at a favourable interest rate, however under the new agreement Evolva will not receive any further milestone payments from Cargill.

EverSweet™ next generation sweetener will initially be produced at a fermentation facility on Cargill's Blair, Nebraska campus that will be retrofitted for this purpose.

The facility will be operated by Cargill and additionally be used for the fermentation of other Evolva products. In parallel, Evolva will build and operate a new state-of-the-art bioprocessing facility on adjacent land leased from Cargill. This bioprocessing facility will manufacture Evolva products such as nootkatone and resveratrol and is expected to come online in 2019. Together, this integrated infrastructure will provide Evolva with a global hub for the production of high value specialty ingredients.

The production strategy provides a de-risked route for Evolva to establish its own low cost production of specialty ingredients through a collaboration with one of the world's pre-eminent bioprocessing companies. Locating these operations in Blair, Nebraska also allows Evolva to leverage and access key resources such as Cargill's centralised infrastructure, a skilled local labour pool, and a long-term supply of renewable resources from US farm inputs (corn, in particular). A number of world-class producers like Novozymes, Corbion and Evonik operate on the same Cargill campus in Blair.

Over the next three years, principally in 2018 and 2019, Evolva expects to invest an estimated USD 60 million in the combined fermentation and bioprocessing facilities for EverSweet™ and its other products. The recent CHF 30 million equity commitment from Yorkville serves as a foundation for this investment and Evolva expects to secure an additional project financing package of around CHF 30 million by end 2017, which will enable full execution of the plans.

New Trend: Light aluminium drink bottles

www.schulergroup.com

Aluminium drink bottles are predicted rapid growth: Leading bottlers are increasingly using “DWI Bottle Cans” as premium packaging, which allows for improved freedom of design. As Drawing and Wall Ironing (DWI) is used in production of bottle cans, they require significantly less raw materials than traditional extruded bottles. Experts are going so far as to say that, in the future, more of these aluminium bottles will be produced every year than aerosol cans. The trend has spread from Japan to the USA and also to China.

It is in this context that the world’s largest press manufacturer, Schuler, has partnered up with Japanese specialists in DWI Bottle Cans, TMC. TMC is a market leader in machinery for the production of aluminium bottles and has developed a machine to form bottle necks (“Bottle Necker”) with ambitious tool technology. They are defining the individual design of metal packaging with this.

The TMC-neckers are available with 40 to 56 forming stations. Independently of this, the maximum diameter of the bottles is 59mm or 66mm, with a maximum bottle length of up to 245mm. The rate of production is up to 150 bottles per minute. TMC Bottle Neckers are in use all over the world. The company has further locations such as in Hong Kong and in the USA.



Experts are going so far as to say that in the future, more of these aluminium bottles will be produced every year than aerosol cans. (© Schuler)

Bottle Cans production lines generally consist of a cupping press, a “Bodymaker”, a “Light Tester”, and a Bottle Necker, as well as cleaning, decorating and inspection equipment. Schuler is offering high-performance Cuppers and highly flexible ServoCupFormers as well as Bodymakers with complete mass balancing (Body-Former) from its own production. Schuler is taking over commercial representation for TMC Bottle Neckers in Europe, Latin America, the Middle East and Africa. .

SVZ marks 150 years of fruit and vegetable passion

www.svz.com

SVZ, global supplier of premium fruit and vegetable ingredients, this year celebrates its 150th anniversary of agro-supply chain control and production of processed fruit and vegetable ingredients. Continuous growth, commitment to innovation and quality have all allowed SVZ to become a major supplier of fruit and vegetable purees, juices, concentrated puree and juice concentrates to some of the major food and beverage manufacturers across the world.

In 1867 Mr A. Zwanenburg, one of SVZ’s founding members and the Z of the SVZ name, opened his business as a commission trader. 79 years later, the company purchased its first processing factory and soon after joined forces with the Spyers Brothers and Van der Vijver, giving life to the SVZ name.

In 1985, SVZ purchased its first Spanish factory in Almonte, in Huelva region, the European strawberry hub. A year later, SVZ further strengthened its agro-industrial credentials by becoming part of Royal Cosun, an agro-industrial concern on a co-operative basis until, in 2000, SVZ broadened its portfolio and footprint with the purchase of the Seneca factory in Othello, now SVZ USA. The company now

operates four manufacturing locations and employs over 500 people globally.

Anouk ter Laak, CEO of SVZ, comments: “SVZ’s heritage is a source of inspiration for all of us. Since its foundation 150 years ago, SVZ has been focused on delivering to the highest standards. Growing and perfecting our product offering, agro-supply expertise and sustainability credentials has always been a key driver of our growth and success, as well as that of our customers”.



Tetra Pak Launches Two New On-the-Go Packages

www.tetrapak.com



Tetra Prisma® Aseptic 200 ml with DreamCap 26, Energy drink (© TetraPak)

Tetra Pak has extended its leadership in the fast growing on-the-go beverage market with two new portion size packages, the Tetra Prisma® Aseptic 200 and 250 Edge with DreamCap™ 26.

Building on the success of the stylish Tetra Prisma® Aseptic 330 ml with DreamCap™, the new packages offer consumers smaller size options with the same re-sealable one-step closure for an optimised drinking experience.

More than 40 % of global consumers are snacking while on-the-go at least once a week¹, with fortified milk, drinking yogurt and energy drinks among their favourite choices. Yet for some, a portion size of 330 ml or more may simply make them feel too full. This means huge market potential for portion packages under 250 ml, worldwide demand for which is anticipated to grow to 72 billion litres by 2019, up 10 % from current volumes, according to Tetra Pak studies.

“Our customers need packaging solutions that can help them capture opportunities and maximise growth. Bringing two new packages to join the highly successful Tetra Prisma Aseptic 330 ml DreamCap is our latest answer to help them exploit the huge potential of the on-the-go market. We are very pleased to have already seen success with the early adopter customers,” Charles Brand, Executive Vice President Product Management and Commercial Operations at Tetra Pak said.

Ken Haubein, President of Jasper Products said, “We are a co-packing solution provider for many brands. In recent years, we have seen a growing interest among our customers for Tetra Prisma Aseptic DreamCap portion packages, and having more size options offers them even greater opportunities to differentiate within the highly competitive flavored milk and beverage market in the U.S.”

The Tetra Prisma Aseptic 200 and 250 Edge with DreamCap 26 aim to mirror the success of the multi-award-winning Tetra Prisma Aseptic 330 ml DreamCap which, since its launch, has become the portion pack of choice for more than 100 customers and more than 340 brands.

¹ Roper Reports Worldwide 2015

SIPA to highlight the evolution of SFL at Interpack

www.sipa.it

For the first time, as a world preview, SIPA will present a new model of its best in class linear blowmolding systems, the SFL 6/8 EVO on stand B73 in Hall 13.

The SFL 6/8 EVO will carry all the technological advantages of the successful system, plus it will be even more performing: the output is increased by 10 %, it will reach now the 2000 b/h/c while SIPA has further reduced consumption on both preform heating and bottle blowing.

Another innovative feature is the new clamp opening and closing system: directly driven by brushless motor reducer, the clamp can adjust the width of the opening accordingly with the container to be blown in order to expand production flexibility.

In addition to its capability in two-stage systems (SIPA also makes several sizes of XFORM preform injection molding units), SIPA will highlight its ECS range of single-stage ISBM equipment at the show. This range was extended several months ago with the addition of two smaller models when SIPA acquired Automa's ISBM busi-

ness. These ECS ‘SP’ units, which were recently upgraded, have enabled SIPA to improve its ability to provide a full service to companies producing specialty containers in all shapes and sizes, whatever the output requirement.



(© SIPA)

With new technology developments launched every year, SIPA stays in tune with market needs. It is one of the few in the market to provide flexible bottling lines suited to match with the current trends of the beverage market, with its demands for lighter bottles, increased product differentiation, and multiple product formats, including large sizes containers. SIPA bottling lines allows bottlers to fill multiple products on the same line like water, CSD and hot filled juices enhancing the value of the investment.

The right move

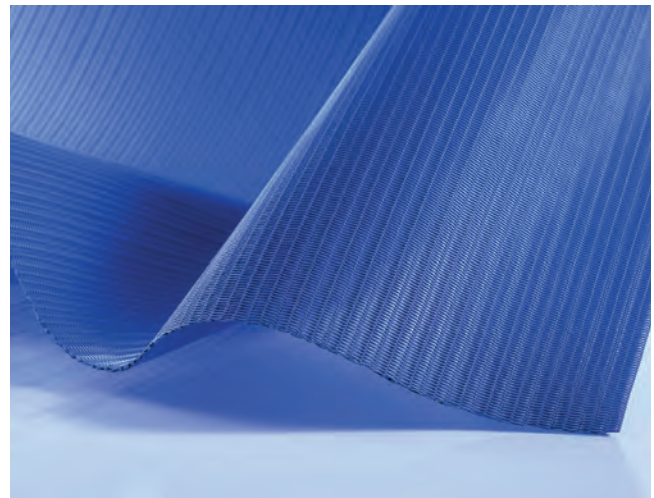
www.gkd.de

GKD complements its process expertise with spiral fabric belts

Spiral fabric belts are the established standard in countless industrial and municipal applications. Wherever seamless belts are an indispensable component in dewatering, transport or drying processes, they help to secure the required level of production efficiency. Now, GKD - GEBR. KUFFERATH AG, world leader for technical meshes, has expanded its process belt portfolio to include spiral fabric belts and has created a complete manufacturing environment specifically for this belt type at its parent works in Dueren, Germany. This means that customers for spiral fabric belts can now also benefit from GKD's all-round expertise – proven over decades in numerous key sectors by this reputable solutions provider – in all stages of production, from application-specific configuration and manufacture through filling, linking and fixing to final assembly.

Whether for dewatering of sewage and industrial sludge, for the production of fruit juices or for forming nonwovens – users all over the world rely on process-customised plastic woven mesh belts from GKD. However, for applications where, due to their construction, spiral fabric belts are superior to woven mesh belts, customers have long bemoaned the fact that this kind of screen was missing in the product portfolio of the process belt experts. For these seamless screen belts have a clear advantage in applications where a seam is prone to breakdowns due to mechanical strain or may create markings in the product. This is why seamless spiral fabric belts are used widely in dewatering processes with fibrous products like coir.

Spiral fabric belts are also frequently deployed in a range of thermal applications like veneer drying, the production of plasterboards or in multiple storey dryers in the food-processing industry. Reason enough for GKD to add spiral fabric belts to its product portfolio. To ensure that the customers get the maximum benefit of the company's integrated competence in consulting, engineering, production and service, a completely new manufacturing environment compliant with the latest standards has been created. Now, GKD also produces and fixes the individual spirals application-specifically at its own works. Depending on the intended use, the spirals of round or flat wire can be equipped with antistatic properties or improved abrasion resistance. In the course of the production process, the spirals are linked into each other and joined using a pin wire into spiral fabric belts measuring up to six metres in width. The linking and the connector give the screen belts stability and track accuracy. To increase the cross-stability even more or to equip the screen for



Spiral fabric belts are available from GKD as filter or dryer belts and also as transport belts. (© GKD)

deployment in a double-belt dryer with a magnetic support system, an additional pin wire made of magnetised steel is also an available option. Thanks to the specially formed filler wires worked into the spirals, GKD can specifically configure the air permeability of the screens to match the individual deployment scenario. For example, the aperture for sludge dewatering is equivalent to that of the tried-and-tested mesh type 1003. In contrast, for use in dryers the aperture is correspondingly larger. After the linking stage, GKD gives the unfinished screen its final properties as a spiral fabric belt through precision thermal treatment, cutting and edge sealing on both sides – all tailored to the individual case. The screens are delivered to the customer safely packed as roll.

Always the best solution

Spiral fabric belts are available from GKD as filter or dryer belts and also as transport belts. Up to six metres wide, produced seamlessly and cut to size, they excel through their consistently robust construction, their high degree of cross-stability and their resistance to mechanical strain. Application-specifically configured air permeability, track accuracy, high throughput performance and good product discharging properties make the new GKD spiral fabric belts – filled or unfilled – the premium choice for a wide range of applications where conventional woven mesh belts reach their limits. Thanks to the winning combination of their all-round solutions expertise in plastic woven mesh belts and spiral fabric belts and their extensive experience in the sector, the Dueren-based process belt specialists can always provide their customers with the optimal individualised solution – all from a single source, in proven GKD quality, and “Made in Germany”.

Britvic innovators develop a bottle made of wood fibre

www.britvic.com



In partnership with Innovate UK and Natural Resources (2000) Ltd, the soft drinks manufacturer has been working to revolutionise packaging across multiple sectors with sustainably sourced, renewable wood fibre materials which are fully recyclable. (© Britvic)

Britvic's annual sustainability report highlights packaging innovation, alongside waste and water reduction achievements as part of the FTSE 250's £240m supply chain investment programme

Britvic, the owner of major soft drinks brands including Robinsons squash, J20 and Fruit Shoot, and the PepsiCo bottler in the UK, has taken significant steps towards exploring wood fibre bottles as a viable packaging option for multiple sectors.

In partnership with Innovate UK and Natural Resources (2000) Ltd, the soft drinks manufacturer has been working to revolutionise packaging across multiple sectors with sustainably sourced, renewable wood fibre materials which are fully recyclable.

Investigating the new wood fibre packaging technology formed part of Britvic's broader R&D work stream within

the sustainability strategy in 2016. It is early days and the bottle forms one of a number of potential solutions at this point. More importantly, the research process into fibre and pulp has provided essential information for Britvic's R&D team to explore further alternative packaging solutions going forward.

As well as investment in R&D, Britvic's sustainability strategy places environmental initiatives at the heart of the business. Britvic is currently half way through a £240m supply chain investment programme to maximise efficiency across its manufacturing sites, reduce waste and improve its environmental footprint.

As part of this programme, £25m was invested at the Leeds plant, which employs over 200 people, to create a new high-speed bottling line, resulting in a 22 % reduction in water use and a 45 % reduction in energy consumption relative to production volumes. The upgrades have also allowed the Pepsi bottler to access the latest in packaging technology, allowing Britvic to blow and fill lighter bottles, thereby reducing the amount of plastic packaging needed per year by 155 tonnes, the equivalent weight of over ten double decker buses.

Meanwhile, Britvic has invested in upgrading equipment and processing techniques to deliver greater water efficiency, resulting in a reduction in total water consumption of 0.4 % despite a 0.7 % increase in production volumes. This saving is equivalent to the volume of water needed to fill five Olympic swimming pools.

Finally, as part of Britvic's commitment to reducing waste, Britvic sent zero waste to landfill in GB, and maintained a recycling rate of nearly 92%. As part of its community outreach, the company also partnered with RECOUP - member based plastics recycling organisation - to encourage 25,000 festival goers at Liverpool's Fusion Festival to recycle their plastic bottles, which resulted in the collection and recycling of over 10,000 plastic bottles, saving the equivalent of nearly half a tonne of carbon.

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Full range of Tetra Pak eBeam-based filling machines now available

www.tetrapak.com

Tetra Pak has announced that the full range of Tetra Pak® E3 machines, which is based on the revolutionary eBeam technology, is now ready for customer rollout.

This means that customers can now produce all types of beverage products on an eBeam-based filling machine, both ambient and chilled, and in family or portion sized packages.

Charles Brand, Executive Vice President Product Management and Commercial Operations said: “The use of eBeam in the packaging material sterilisation process is a ground-breaking first in the carton packaging industry. This will help the customer to cut operational costs by as much as 20%, while reducing the environmental impact, making water recycling easier and lowering energy consumption.”

The Tetra Pak® E3/Speed Hyper, the world’s fastest aseptic carton filling machine, is among the latest introductions to the range. The new machine runs at an industry-leading capacity of 40,000 ambient portion packages per hour, more than 60 % faster than its next nearest carton packaging rival. This is possible thanks to the introduction of eBeam sterilisation, which completes the task more efficiently and more rapidly than has previously been possible.



Tetra Pak® E3 platform.

(© Tetra Pak)

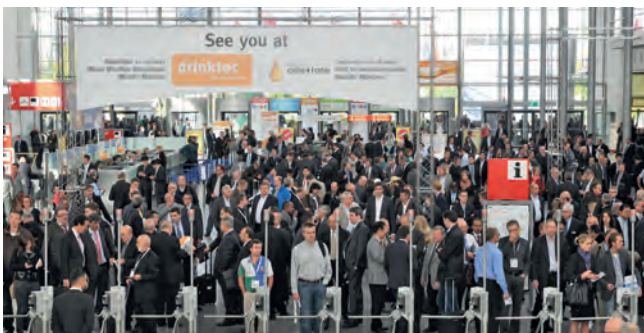
Also making its debut in the range is the Tetra Pak® E3/Flex which will produce a new chilled family package, the Tetra Brik® 900 Ultra Edge. With a shape that is taller and slimmer than many family size carton packages on the market, this innovation helps customers differentiate their products in the highly competitive chilled market.

With the two latest additions, Tetra Pak now offers a full range of eBeam based filling machines:

- Tetra Pak® E3/CompactFlex for chilled portion packages;
- Tetra Pak® E3/Speed for ambient family packages;
- Tetra Pak® E3/Flex for chilled family packages;
- Tetra Pak® E3/Speed Hyper for ambient portion packages.

A record line-up for the start of drinktec 2017

www.drinktec.com



drinktec, a magnet for visitors

(© drinktec)

In September 2017 drinktec will be able to boast the biggest participation figures in its over 60-year history. Around 1,600 exhibitors are expected to take part in the “World’s Leading Trade Fair for the Beverage and Liquid Food Industry”, taking place from September 11 to 15, 2017 in Munich. With the integration of SIMEI, the world’s leading international trade fair for winemaking and bottling technology, total hall space taken up by drinktec rises to over 150,000 square meters.

The exhibitors represent the entire process chain: from the manufacture, filling and packaging of beverages and liquid food through to marketing - raw materials, beverage ingredients and logistics solutions included.

drinktec is regarded as a platform for innovations. The latest solutions and entire systems are presented in Munich for the first time – and this is a unique selling point of drinktec. This trade fair is renowned for the spectacular displays put on by its exhibitors at their booths. Nothing is too much trouble for them when it comes to making a big impression with the global trade audience. For example, entire filling and packaging lines of all kinds (from low-tech to high-tech) are set up in the halls, bottles run past on conveyor belts, innovative PET bottles are produced live – just like in a real industrial set-up. And all of this is on view and in operation for trade visitors on all five days of the fair.

More than 70,000 trade visitors from all over the world and from all areas of the beverages industry will be coming to drinktec 2017.

SternLife inspires sellers of branded goods with new protein concepts

www.sternlife.de

Protein products have long ceased to be marketed only to athletes and people with weight problems. More and more people are using high-protein products to boost their personal well-being. Innova Market Insights has labelled this latest top ten trend “Body in tune”. SternLife has come up with attractive product ideas that enable the sellers of sports and health foods as well as drugstores and supermarkets, with their own private brands, to cater for the ongoing protein trend. At this year’s Vitafoods in Geneva, the specialist for functional foods presents inspiring private label concepts for diverse target groups.

Protein shake with individual add-ons

The new protein shake, with 80 per cent protein made from milk, whey and egg, is ideal for strength training and fitness enthusiasts but also for figure-conscious consumers who favour a low carb diet. Special feature: the basic mix can be tweaked by adding various functional

compounds to suit specific target groups. For instance, through the addition of BCAAs, L-glutamine, vitamin C and magnesium the basic shake can be turned into a post-workout shake that quickly recharges batteries after training,

For consumers with an interest in weight management, SternLife offers compounds with functional plant extracts like green tea or green coffee which boost the metabolism. An extra portion of red or green super food not only colours the shake, it also supplies a natural plus of antioxidants, vitamins and trace elements. The addition of innovative aromatic compounds turn the protein shakes into a special flavour experience. With options like “Cinnamon Roll” or “Salty Caramel”, the SternLife add-on shakes are completely on-trend when it comes to flavour. Hence, the concepts tailored to clear target groups offer the manufacturers of sports and health foods considerable value-added potential.

Healthy soft drinks are in demand, says GlobalData

www.globaldata.com

As global consumers’ attitudes towards soft drinks grow increasingly negative due to their high levels of sugar, calories, and ‘artificial’ ingredients, new opportunities are arising for companies to diversify their portfolios, according to research and consulting firm GlobalData.

The company’s latest report states that healthy, ‘clean’ and functional soft drinks are in demand, with 89 % of global consumers finding general health and wellbeing claims appealing in food and drink products. These consumers are seeking convenient ways to improve their personal wellbeing and live a more holistic lifestyle, without cutting soft drinks completely out of their diet. In this way, manufacturers must reduce sugar and calorie content, use plant-based sugar alternatives, and enrich products with essential vitamins and minerals to appeal to modern consumers.

Melanie Felgate, Senior Consumer Analyst for GlobalData, explains: “The sugar backlash, concerns around artificial ingredients, and a desire for a ‘cleaner’ lifestyle are driving demand for beverages that are deemed ‘better for you’ than regular soft drinks. Consequently, manufacturers must reduce sugar content and offer products with functional benefits, such as promoting gut and digestive health, to appeal to consumers seeking healthier products that are still similar to traditional soft drinks.”

One such example is Karma Probiotics Wellness Water, a product developed in the US which claims to contain a patented ingredient providing up to 10 times as much digestive health-promoting live culture than probiotic yoghurt.

Additionally, on-pack credentials such as logos and certificates, and popular health claims like ‘pure’ and ‘clean’ will further appeal to the 66 % of global consumers interested in food and drink products with ‘natural claims’, which should be supported by the inclusion of health-enhancing natural ingredients and flavorings such as ginger, turmeric and cinnamon.

Felgate concludes: “It is imperative that soft drinks manufacturers better utilize health trends in order to compete in the market. Effective targeting will help brands to remain relevant to consumers’ changing preferences and shopping habits in this highly competitive space. This is highlighted by the 59 % of global consumers who believe that they are often or always influenced by how soft drinks impact their health when choosing products.

“The sugar backlash and rising health-consciousness have hit a critical point where ‘better for you’ has transitioned from desirable to necessity.”

BUSINESS CONTACTS

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Please contact **Mrs Cornelia Hebbe**: phone +49 (0) 2634 9235-16 or cornelia.hebbe@fruit-processing.com

MARKET PRICE REPORT

(Price Information without Liability)

Source: Survey by confructa medien GmbH, from a minimum group of 5 marketers and 5 juice purchasers for each product. Since its first publication in 1991, more than 40 industry partners – manufacturers, traders, processors, bottlers, packers, bankers – have been contributing data.

Your price quotation data, too, is much appreciated.
Please forward your contributing input directly to the editorial team
c/o christian.friedel@confructa-medien.com

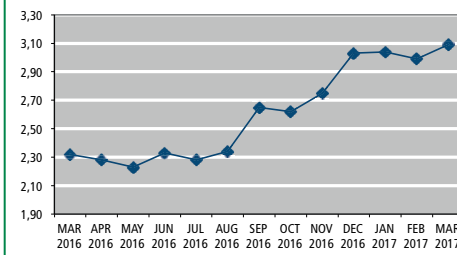
Prices: The price range is calculated for juice or puree of different proveniences, traded in drum or bulk; \$/kg = cif Rotterdam; EUR/kg = DDP

Custom Duties: The range encompasses preferential duties up to 30 %

◆◆ This line represents the development of the mean values (excepted graph 'orange juice concentrate – future markets')

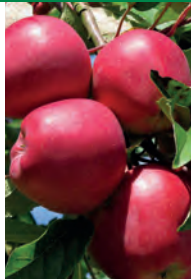
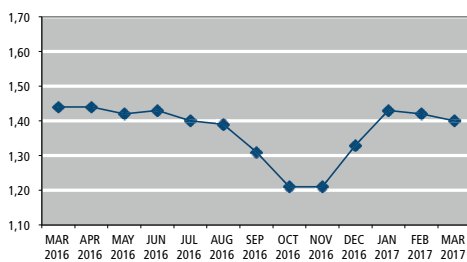
Orange Juice Concentrate

65 °Brix, \$/kg



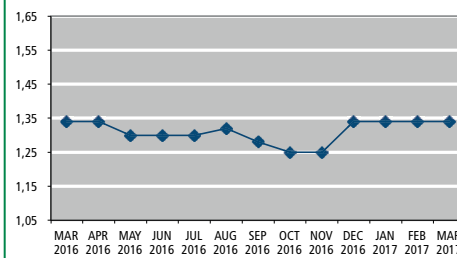
Apple Juice Concentrate

70 °Brix, high acidity, EUR/kg



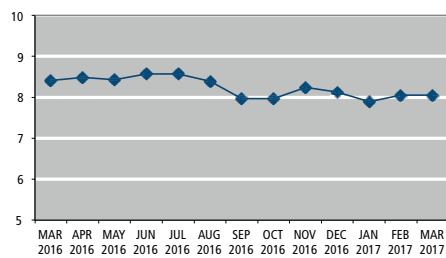
Apple Juice Concentrate

70 °Brix, low acidity, EUR/kg



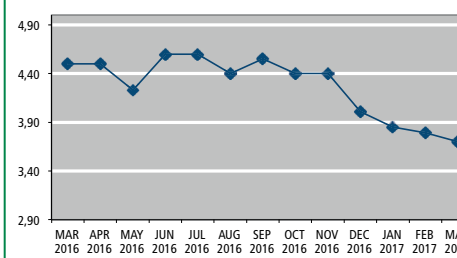
Passion Fruit Juice Concentrate

50 °Brix, \$/kg



Pineapple Juice Concentrate

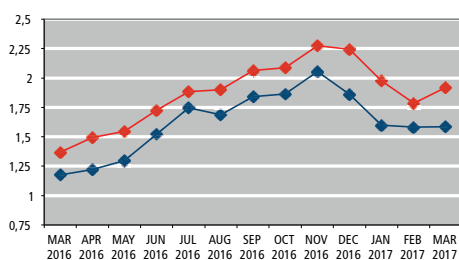
65 °Brix, \$/kg



Orange Juice Concentrate

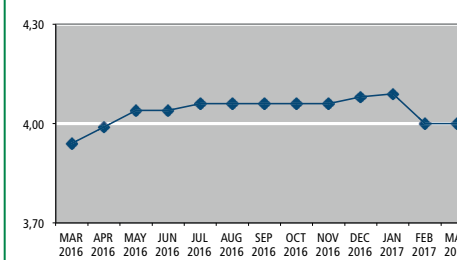
Future Markets \$/lb.

◆◆ = highest values
◆◆ = lowest values



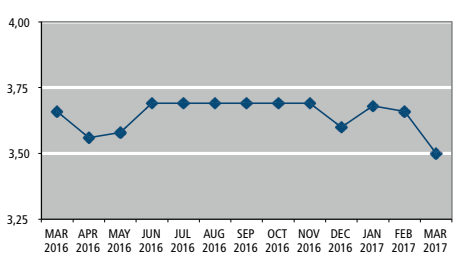
Lemon Juice Concentrate

cloudy, 400 g/l acid, \$/kg



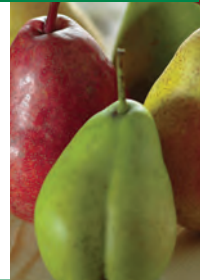
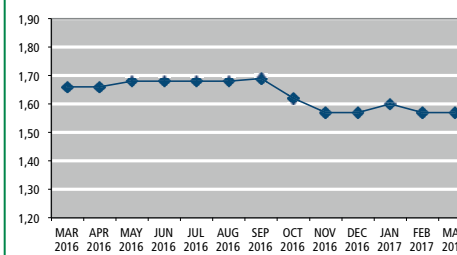
Grapefruit Juice Concentrate

58 °Brix, \$/kg



Pear Juice Concentrate

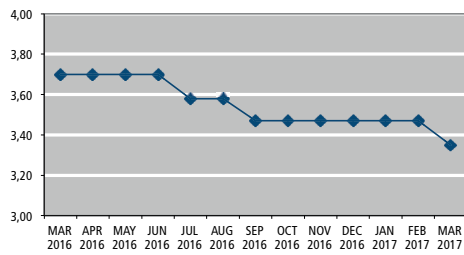
65 °Brix, EUR/kg



MARKET PRICE REPORT

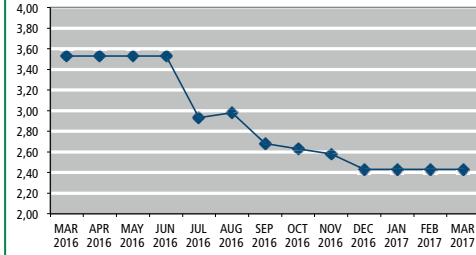
Sour Cherry Juice Concentrate

65 °Brix, EUR/kg



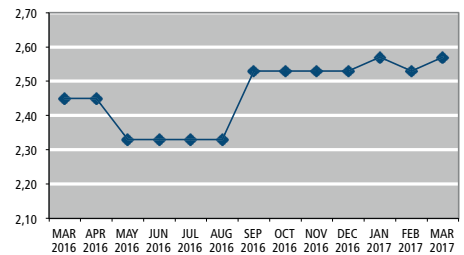
Black Currant Juice Concentrate

black, 65 °Brix, EUR/kg



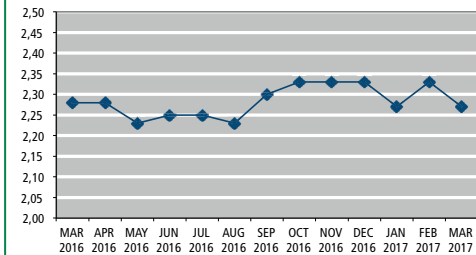
Grape Juice Concentrate

white, 65 °Brix, EUR/kg



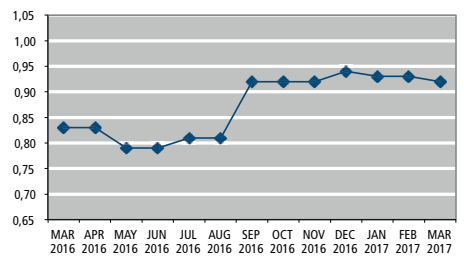
Grape Juice Concentrate

red, 65 °Brix, EUR/kg



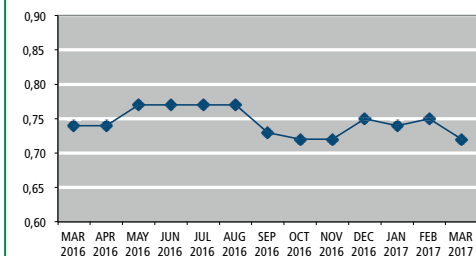
Apricot Puree

EUR/kg



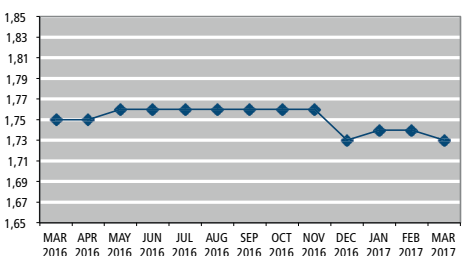
Banana Puree

22-24 °Brix, \$/kg



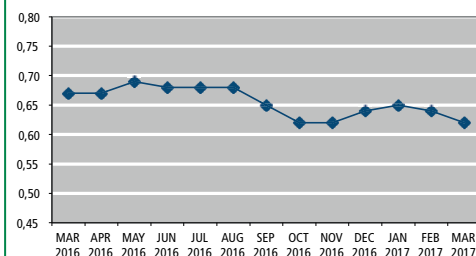
Mango Puree

15 °Brix, \$/kg



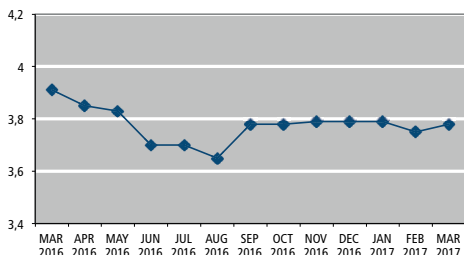
Peach Puree

EUR/kg



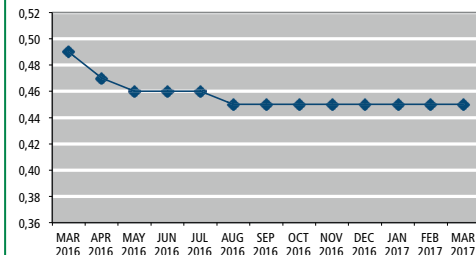
Carrot Juice Concentrate

65 °Brix, EUR/kg



Carrot Juice

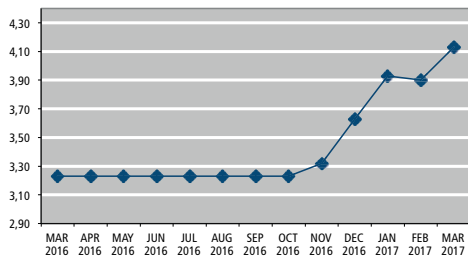
EUR/l



MARKET PRICE REPORT

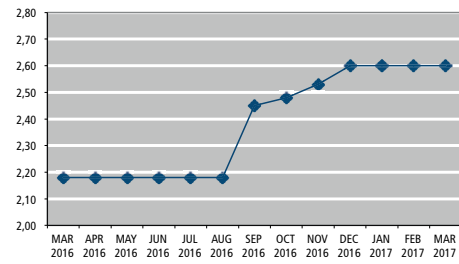
Orange Juice Concentrate

organic, 65 °Brix, \$/kg



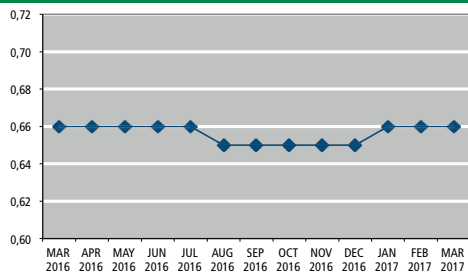
Apple Juice Concentrate

organic, high acidity, 70 °Brix, EUR/kg



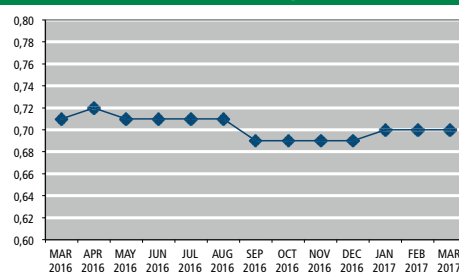
Carrot Juice

organic, EUR/l



Red Beet

organic, EUR/l



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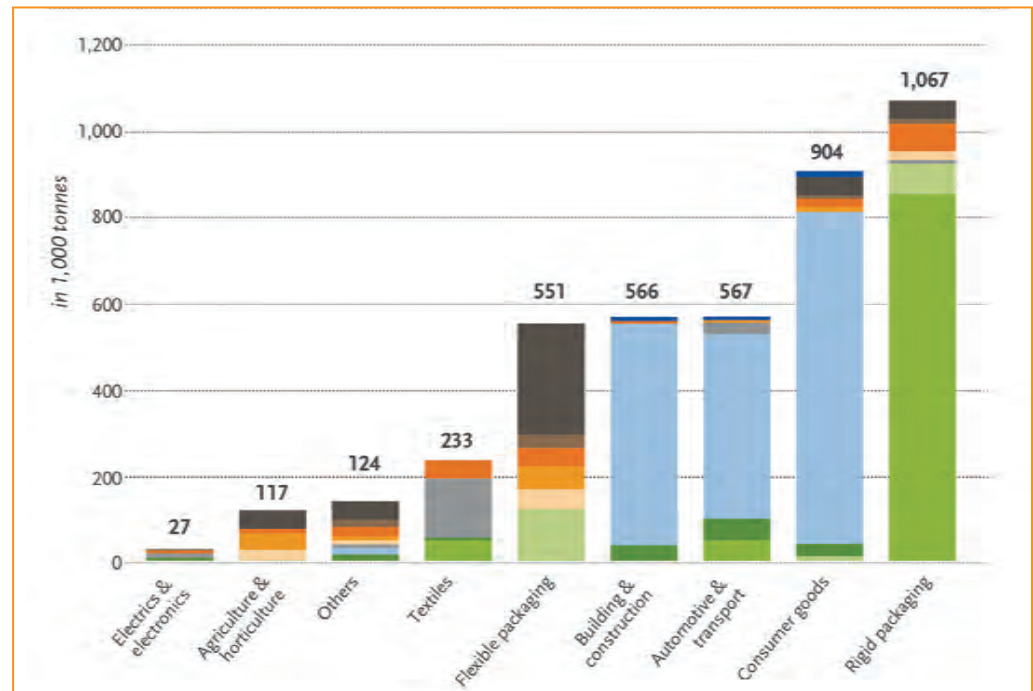
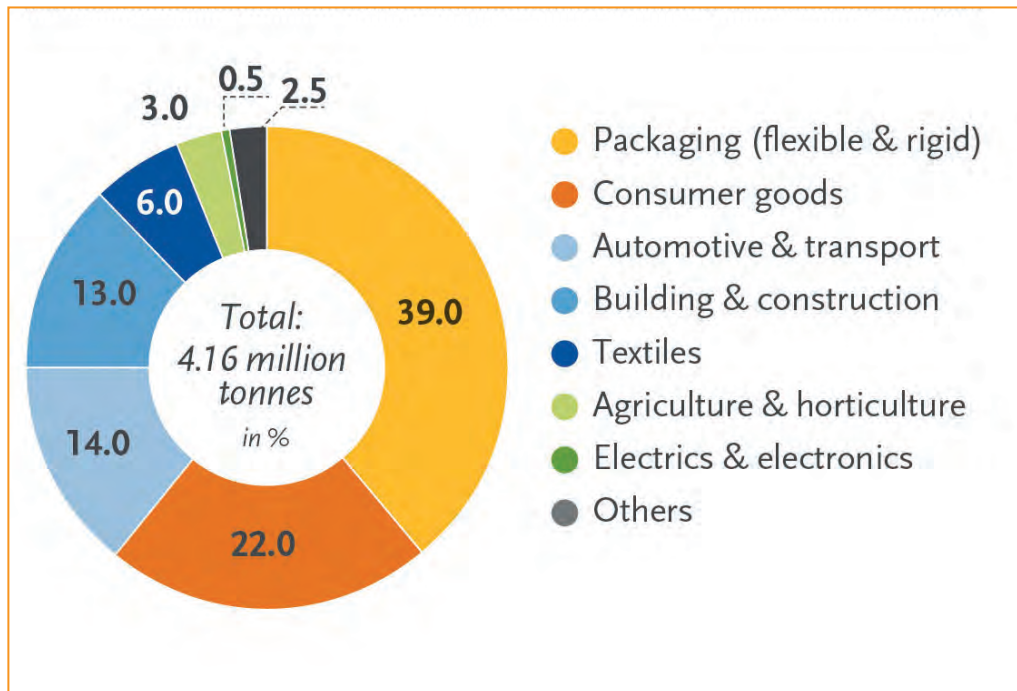
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Market Data – confrica media GmbH

Global production capacities of bioplastics 2016 (by market segment)



Bioplastics – market drivers and development

In 2016, global production capacities of bioplastics amounted to about 4.2 million tons with almost 40 percent of the volume destined for the packaging market – the biggest market segment within the bioplastics industry. Today, there is a bioplastic alternative for almost every conventional plastic material and corresponding application. Bioplastics have the same properties as conventional plastics and offer additional advantages, such as a reduced carbon footprint or additional waste management options such as composting. The current market for bioplastics is characterised by a dynamic growth rate and a strong diversification. There is a multitude of applications for bioplastics ranging from beverage bottles (bio-based PET) in the packaging segment to keyboards in the consumer electronics segment and interior parts in the automotive sector.

www.bioplastics.org/market

(Source: European Bioplastics, nova-Institute – 2017)

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