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The November Edition of Food Marketing & Technology Magazine is our Drink Technology Special, dedicated to the dynamic world of beverages, where innovation meets indulgence. As the beverage industry continues to evolve with changing consumer preferences, sustainability goals, and cutting-edge technologies, this edition explores the latest trends shaping how drinks are processed, packaged, and presented.

From advanced beverage processing technologies that ensure quality, consistency, and efficiency, to innovations in customised beverage packaging that enhance brand identity and consumer experience, this issue takes a closer look at the science and creativity driving the sector forward. Packaging today is no longer just about protection , it's about storytelling, sustainability, and smart functionality.

We also delve into the fascinating realm of coffee packaging, a niche that combines aroma preservation with aesthetic appeal. With coffee culture booming across the globe, manufacturers are redefining how packaging can elevate both freshness and emotional connection with consumers.

Beyond technology, our contributors discuss the future of functional beverages, sustainable materials, and energy-efficient production processes , topics that are becoming increasingly vital in shaping the next generation of drink innovation.

The magazine continues to be your trusted source for insights, expertise, and industry updates from thought leaders and innovators in the F&B sector. Grab your favorite beverage and dive into this refreshing edition filled with knowledge, innovation, and inspiration from the world of drink technology.

Linda Brady Hawke

Driving the Beverage Future

Beverage technology is such a challenging topic, because there is so much of it! The recent drinktec trade show in Munich, Germany, was amazing and covered many aspects, from beer and spirits, to juices, dairy and even water drinks. Every branch had its own highlights. Some of our favourites are included here.

Have you ever tried eating hops? As a beverage ingredient, hops can have a signicant effect on the flavour profile of beer. As an ingredient on its own, in ice cream or 'Hop Corn', for example, it is an acquired taste. With malt ingredients the efffect is not as dramatic, but the effect is very pleasant. Why is this important? As the global beer consumption contunes to reduce, alternative uses are being found for these ingredients.

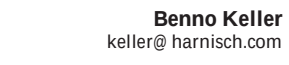
The drinktec show brought together decision-makers from every corner of the globe to find dialogue regarding innovation, strategy and investments in all branches. These included process technologies, filling and packaging technology, logistics and information technology, as well as raw materials.

Other highlights which we expect to see in the near future could be seen at the so-called "Liquidrome – Hotspot for knowledge transfer and networking". The new format provided additional impetus. Under this branding, the trade fair team presented a wide-ranging supporting programme: exhibitor talks, presentations on research projects, and practical insights form the backdrop for strategic decisions in visitors' own market and brand scenarios. In this environment, numerous start-ups showcased new solutions and answered critical questions from the audience during start-up pitches.

Many offerings in Liquidrome focussed on the key topics of "Circularity & Resource Management," "Data2Value," and "Lifestyle & Health," some of the new buzzwords in beverage trechnology. "Here on our large stage, we had a diverse programme including macro trends, AI solutions for practical use, and numerous ideas for resource-efficient production," emphasized Markus Kosak, Executive Director of the drinktec exhibiition. With several offerings on innovation strategies and insights from the start-up scene, the Deep Dive Lounge in the Liquidrome complemented the programme and offers ample space for networking.

"We also see strong potential in the functional beverages sector – for example, beverages with health benefits – which is why we have integrated a health bar into the Liquidrome. There, selected partners offer tastings of innovative beverages. This allows them to provide the industry with ideas on how to potentially tap into the segment of beverages with added benefits," says Markus Kosak.

What a great beverage benefit! New things, like flavours or textures, can be tried out in a specific product and later be quickly adapted for other foods.



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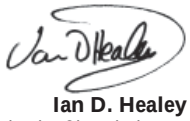

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November 2025

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Mr. Pibb now features 30% more caffeine than its predecessor

The Coca-Cola Company has answered years of consumer demand by officially bringing back Mr. Pibb, relaunching the spicy cherry soda with a bold new formula and increased caffeine content. The brand, which was renamed Pibb Xtra in 2001, is making a commercial comeback with a "new-stalgic offering" designed to appeal both to loyal fans and a new generation of consumers seeking high-flavor, high-energy soft drinks.

The reformulated Mr. Pibb now features 30% more caffeine than its predecessor, Pibb Xtra, alongside an intensely sweet cherry taste, hints of caramel, and its signature spicy bite. It is being introduced along with Mr. Pibb Zero Sugar.

"Consumers have been asking for Mr. Pibb's bold kick of cherry flavor for some time," said Dane Callis, Director, Sparkling Flavors, Coca-Cola North America. He noted the strong following the brand maintains across social media platforms.

The initial rollout begins this month in select US regions, including Florida, Chicago, Las Vegas, Michigan, and California, with a national expansion planned for 2026.

The new site, which will complement the Company's existing facilities, represents an initial investment of CHF 187 million ($215M) and will span 24,000 square metres

Givaudan, a global leader in Taste & Wellbeing, announced the groundbreaking of its new, state-of-the-art liquids production facility in Reading, Ohio, reinforcing its continued commitment to the North American region. The new site, which will complement the Company's existing facilities, represents an initial investment of CHF 187 million ($215M) and will span 24,000 square metres within a total reserved land area of more than 100,000 square metres to accommodate future growth.

"This new facility represents our largest investment in the US in many years, demonstrating the importance of the market to Givaudan and to the food and beverage industry. It is a tangible example of Givaudan's 2030 strategy in action, strengthening our market and operational presence, extending customer reach, and advancing sustainable, innovative solutions that consumers love," said Gilles Andrier, Chief Executive Officer.

The site is positioned for substantial growth and expansion over time, as Givaudan continues to invest in technologies and processes designed to maximise production while helping to reduce environmental impact. Over time, the new facility will create over 300 jobs across diverse skill sets, highlighting Givaudan's commitment to fostering local talent and the sustainable growth of the economy.

"By expanding our operational capabilities, we're positioning ourselves for future innovation as we continue to deliver tailored solutions within North America," said Antoine Khalil, President Taste & Wellbeing. "Driven by the dedication of our employees, the new facility will strengthen our ability to help grow customer brands by delivering distinctive, memorable food experiences that resonate with consumers."

In line with Givaudan's purpose, the Company has also announced community and environmental initiatives related to the new facility. Plans include support to community programmes, such as educational initiatives, alongside local partners. Additionally, the site will be run without the use of natural gas to further reduce Givaudan's overall GHG emissions. The project will introduce sustainable technologies, such as carbon bed filtration.

Centric Software Named 2025 SPARK Leader for Product Lifecycle Management for Process Industries by QKS Group

Centric Software® is pleased to announce that it has been named Market Leader and Ace Performer in the 2025 SPARK (Strategic Performance, Assessment and Ranking) Matrix by QKS Group®, formerly known as Quadrant Knowledge Solutions. Centric Software provides the most innovative enterprise solutions to design, develop, formulate, source, comply, buy, make, package and sell consumer goods products in cosmetics, food & beverage, grocery and multi-category retail to achieve strategic and operational digital transformation goals.

QKS Group is a leading global advisory and research firm dedicated to empowering technology innovators to accelerate their growth journeys and enable technology adopters to achieve their digital transformation objectives. The SPARK Matrix rates global PLM suppliers based on key market drivers such as specification management, regulatory-first PLM adoption, formulation-centric CPG-driven PLM customers/use cases, sustainability and clean label transparency.

Centric Software scored the highest of all PLM vendors in the two matrix axis attributes: customer impact and technological excellence. This underscores Centric Software's reputation as the market-leading end-to-end PLM solution for brands, retailers and manufacturers across the consumer goods industry.

Akshayakalpa Organic, India's leading certified organic dairy brand, announces the launch of its High Protein Milk

Akshayakalpa Organic, India's leading certified organic dairy brand, announces the launch of its High Protein Milk, further expanding its high-protein portfolio that already includes the high protein paneer and peanut & ragi-based snacks. The new variant is part of the company's ongoing efforts to make clean, functional nutrition accessible to Indian consumers.

Produced from fresh organic cow milk and developed using ultrafiltration technology, the new high protein milk delivers 25 grams of protein per 250ml serving, with a lactose-free formulation. The milk is free from antibiotics, preservatives, and added hormones. It is designed to be gentle on the gut and easy to digest, offering consumers a healthy option that can be consumed directly from the pack or used in smoothies, cereals, and beverages.

Over the past few years, Akshayakalpa Organic has established itself as one of India's fastest-growing clean food enterprises. By year-end, the company aims to surpass the ?550 crore annual revenue milestone, recording 40% year-on-year growth driven by rising consumer demand for organic and functional foods. Today, Akshayakalpa Organic works with over 2,700 certified organic farmers across Karnataka, Telangana and Tamil Nadu. It serves more than 3 lakh individual customers in Bengaluru, Chennai, and Hyderabad through its direct deliveries, quick commerce and retail stores.

The high protein milk will be available from November 3, 2025, across Bengaluru, Hyderabad and Chennai, and can be ordered exclusively through the Akshayakalpa App and on Swiggy throughout November. It will also be available on BigBasket, Blinkit, Zepto, first club and through select retail dealers in key markets starting in December 2025.

Natural ingredients and emotional drivers: key factors reshaping the global nutriton market

The food supplements and nutrition market, which includes protein-enriched beverages, fortified drinks and functional supplements, is projected to reach around $758.99 billion by 2034, expanding at a CAGR of 7%1. To help food and beverage brands better understand the evolving needs of health-conscious consumers and identify opportunities for innovation and growth, Tetra Pak surveyed consumers across the globe, uncovering the trends and regional preferences shaping the future of the category.

A global shift in consumer priorities is reshaping the food supplement and nutrition (FSN) market, with

emotional benefits and local tastes increasingly influencing demand. Tetra Pak's latest research* reveals that consumers are considering FSN products both for their functional benefits to integrate seamlessly into modern lifestyles, and also the emotional, aspirational and performance-driven reassurance these products provide.

Consumers want nutrition that fits their lifestyle

The research showed that consumers are increasingly turning to food supplement and nutrition (FSN) products as part of a holistic approach to wellbeing. The leading motivators include supporting physical health, cited by 58% of consumers, ensuring daily nutritional intake (51%), and maintaining energy levels throughout a busy day (47%). Beyond physical benefits, FSN products are also valued for their role in boosting mental wellbeing and enhancing appearance or fitness.

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From Waste to Wellness: Up-cycling Food Waste into Functional Beverages

By **Dr. Ruchi Verma***

Overview

In the 21st century, food waste has become a global challenge, affecting sustainability, economy, and nutrition security. Nearly one-third of all food produced globally about 1.3 billion tonnes is wasted annually, with fruits and vegetables constituting the largest share of this loss. This discarded biomass contains valuable nutrients, phytochemicals, and functional compounds that can be repurposed into health-oriented products. The concept of "From Waste to Wellness" emphasizes transforming food waste into functional beverages, aligning with the principles of a circular economy while promoting human health and environmental responsibility.

1. Nutritional and Functional Potential of Food Waste

Food processing generates substantial by-products such as peels, seeds, pomace, and pulp residues. These materials, often discarded, are rich in bioactive compounds including phenolics, flavonoids, carotenoids, dietary fibers, and vitamins. Citrus peels, mango kernels, apple pomace, and pomegranate rinds are potent sources of antioxidants and antimicrobial agents. When these components are converted into functional beverages, they not only enhance nutritional profiles but also deliver physiological benefits like improved digestion, reduced oxidative stress, and better metabolic balance. Such compounds play a crucial role in combating chronic diseases, including obesity, cardiovascular disorders, and diabetes. For instance, phenolic-rich extracts from fruit peels can serve as natural functional ingredients that enhance the antioxidant capacity of juices, teas, or fermented drinks. Therefore, valorizing food waste enables both waste reduction and wellness promotion through health-enriched beverage formulations.

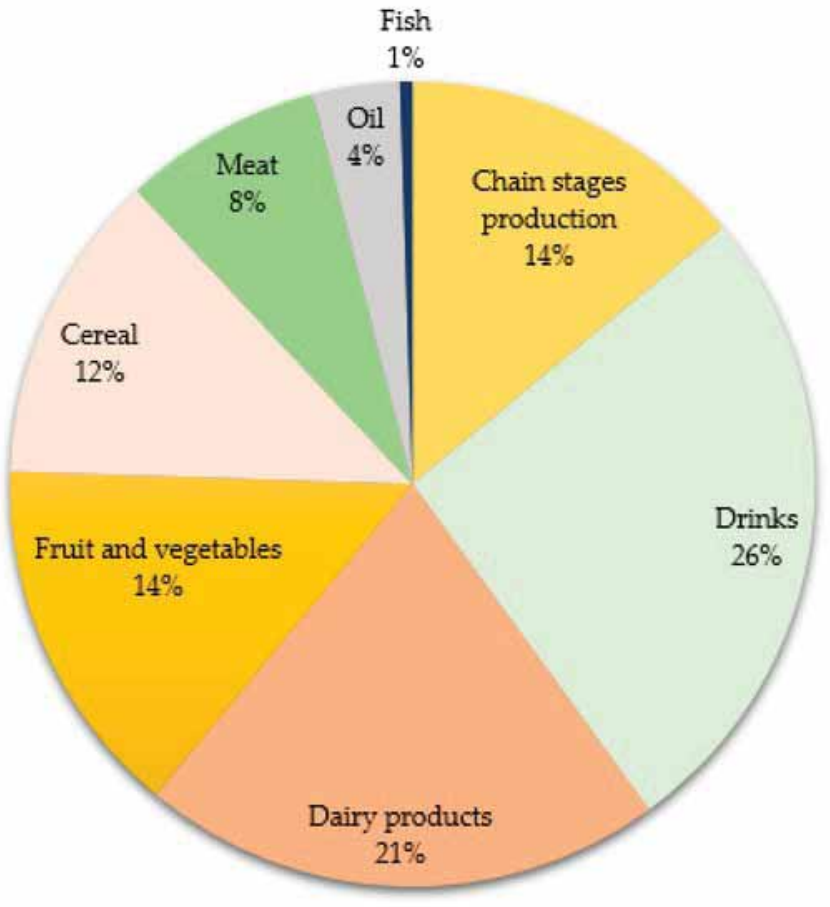

Figure 1. Production of agro-food waste in different industries (Source: Nayak et al., 2019)

2. Techniques and Innovations in Beverage Development

The upcycling of food waste into functional beverages involves various sustainable extraction and formulation techniques. Technologies such as enzymatic hydrolysis, ultrasound-assisted extraction, and membrane filtration efficiently recover bioactives while preserving nutritional integrity. Fermentation using probiotics (e.g., Lactobacillus spp.) represents a promising approach, converting fruit residues into fermented probiotic drinks enriched with organic acids, peptides, and vitamins. For example, pineapple peel and core can be fermented to develop probiotic beverages with excellent sensory properties. Similarly,

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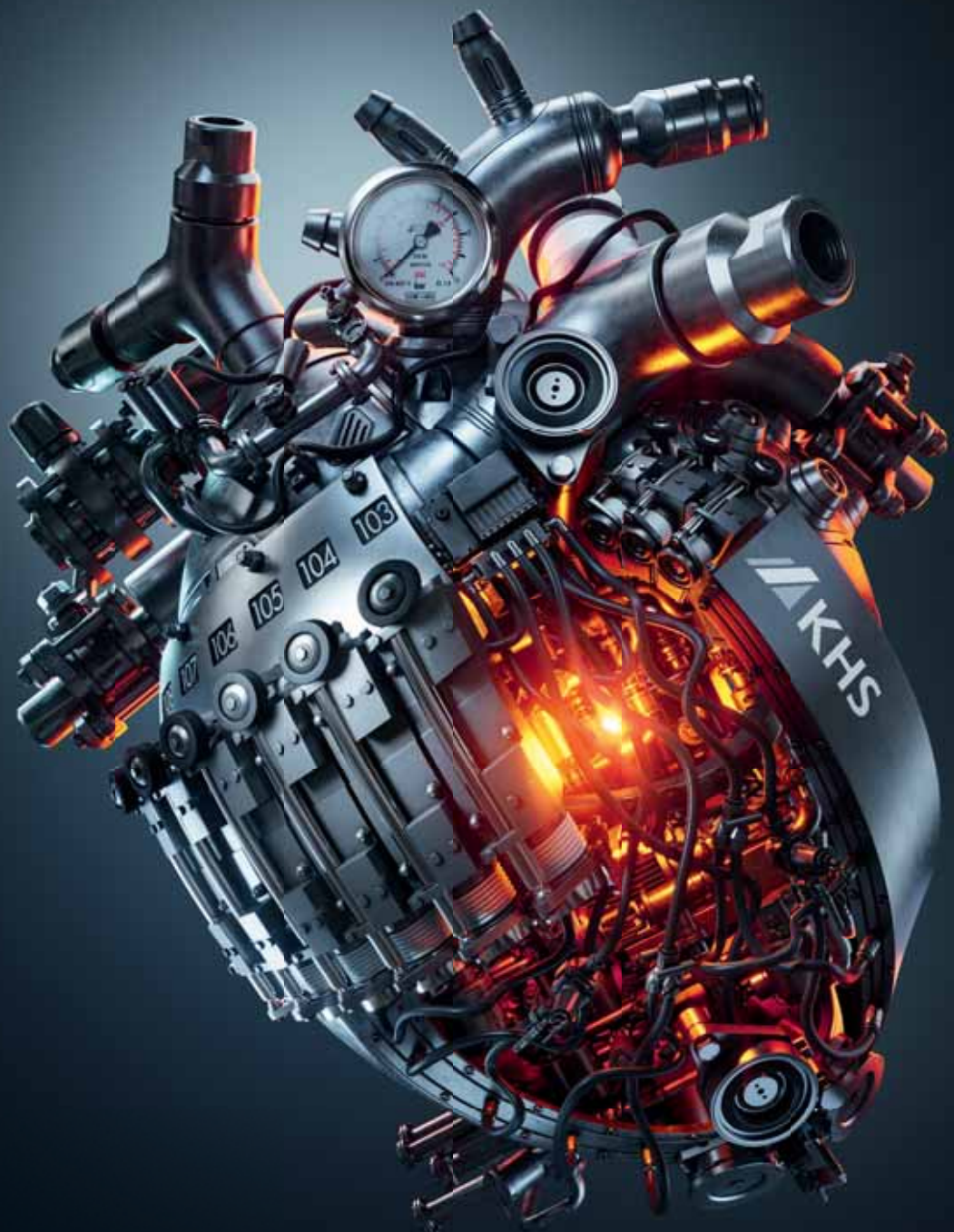

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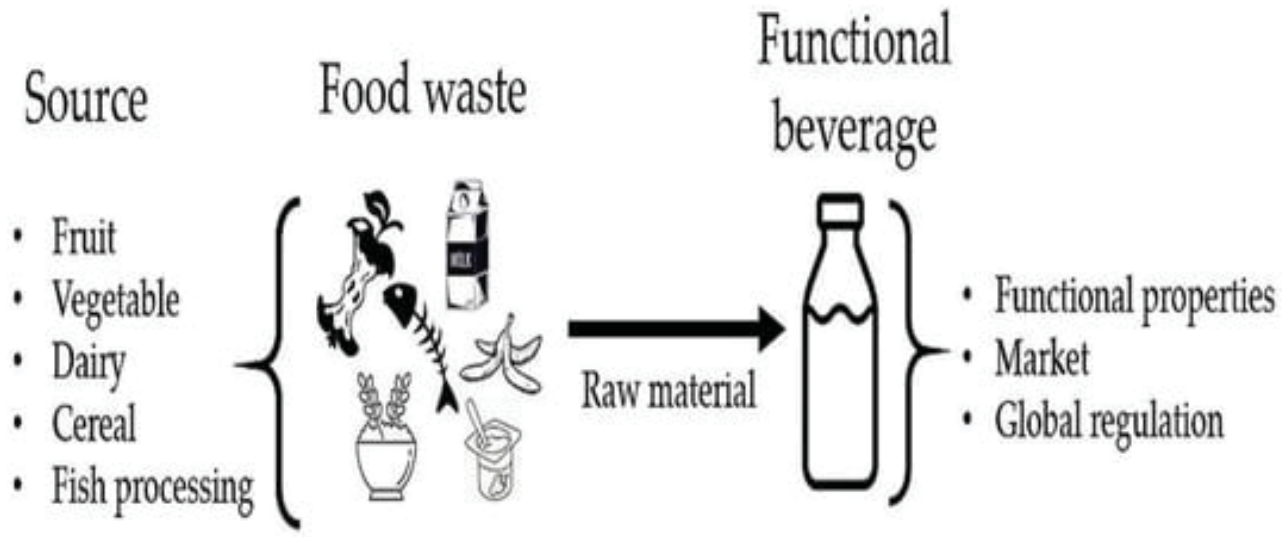

Figure 2. Food Waste as an Ingredient in Functional Beverages (Source: www.mdpi.com)

mango seed kernel extract can be blended into smoothies or dairy-free drinks to enhance antioxidant and antimicrobial activity. Apple pomace and grape skins serve as natural sources of fiber and anthocyanins, making them suitable for developing color-rich, health-boosting beverages. Furthermore, modern encapsulation technologies help stabilize sensitive compounds, ensuring extended shelf life and functionality.

3. Sustainability and Economic Impact

Upcycling food by-products into value-added beverages contributes significantly to sustainable food systems. It reduces burdens on landfills, curbs greenhouse gas emissions, and minimizes resource wastage during food production. Economically, it supports small and medium-scale enterprises to diversify their product lines affordably. Through innovative processing, what was once considered a cost of disposal can become a profitable health-oriented product range. In developing economies, this transformation introduces opportunities for rural entrepreneurship and community-level processing units. Local industries can harness agro-wastes like sugarcane bagasse, citrus pulp, or banana peels to produce low-cost, nutrient-dense drinks. This model not only promotes environmental sustainability but also strengthens local economies by converting agricultural residues into income-generating wellness products.

4. Case Studies and Emerging Trends

Several successful case studies highlight how food waste is being turned into functional beverages globally. In India, researchers have formulated probiotic beverages from fruit pomace such as jamun, banana peel, and citrus waste. These drinks deliver both nutritional benefits and enhanced sensory appeal. Globally, start-ups are producing fruit peel-infused kombucha, vegetable pulp smoothies, and plant-based energy drinks sourced from surplus produce. Emerging trends emphasize zero-waste manufacturing, clean labeling, and consumer awareness regarding circular nutrition. Beverage industries are increasingly integrating artificial intelligence (AI) and machine learning tools to optimize product formulation and quality consistency. Functional beverage prototypes now aim to combine health, sensory satisfaction, and environmental sustainability a triple-win outcome for producers and consumers alike.

5. Challenges and Future Perspectives

While the focus on food waste valorization is growing, challenges remain. Standardization of extraction processes, regulatory compliance, and consumer acceptance are critical barriers to commercialization. Variability in composition and seasonal supply also pose formulation hurdles. Ensuring safety, stability, and sensory acceptance is essential before market introduction. Future research must explore integrated processing models combining fermentation, enzymatic treatment, and green extraction techniques like supercritical CO_2 and pulsed electric fields. Additionally, establishing safety guidelines and quality standards under national and international food regulations will facilitate broader commercialization.

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Collaboration between academia, industry, and policymakers is pivotal to developing large-scale production systems for functional beverages derived from food waste.

Conclusion

The transformation of food waste into functional beverages represents a practical synergy between nutrition, sustainability, and innovation. This approach exemplifies the shift towards circular economies where waste materials evolve into high-value health-promoting products. By adopting sustainable technologies and valorizing agricultural residues, industries can reduce environmental footprints while meeting the growing consumer demand for natural, health-oriented drinks. From waste to wellness, the upcycling of food by-products into functional beverages promises not just a healthier planet, but also a healthier future for humanity.

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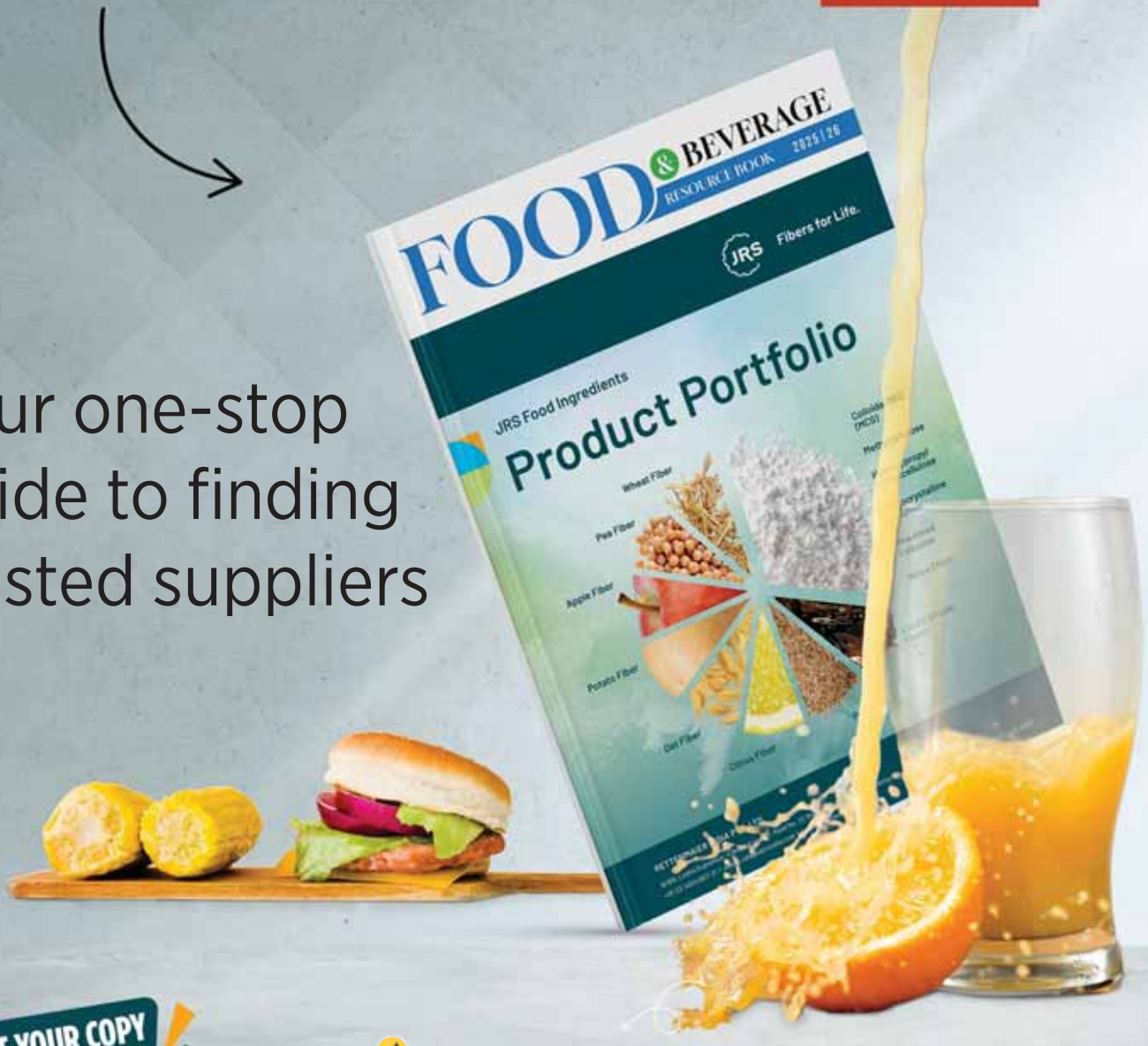

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Small-Scale, Big Opportunities with Flavourtech

Headquartered in Australia, Flavourtech is a world leader in the development, design and manufacture of thin-film, spinning cone technologies for dealcoholisation, aroma recovery, extraction and concentration. Their unique technologies, including the renowned Spinning Cone Column, are benefitting food and beverage manufacturers around the world by enabling them to produce high-quality, specialty products that stand out amongst competitors.

For the last few years, Flavourtech's engineers have been working on the miniaturisation of its technologies. "Going smaller can be a challenge but the engineering team did a great job in redesigning each system from the ground up," Director of Sales & Marketing, Paul Ahn, says. "We made these changes after listening to smaller, specialised companies who wanted to enter the market, and having smaller systems would allow them to do that." Ahn adds that "The plus for universities and research institutes is that these smaller systems are ideal for research projects as well as introducing students to technologies they will use on a larger scale upon joining the workforce."

Flavourtech's technologies now available in smaller models include:

1. The Spinning Cone Column (SCC)

The SCC is designed to extract and recover volatile compounds using steam, under vacuum conditions. This is a far gentler process compared to standard extraction techniques, enabling the SCC to better capture aromas and flavours.

Used across multiple industries, applications for the SCC include:

- Aroma recovery during instant coffee production
- Simultaneous flavour and soluble solids extraction for Ready-To-Drink tea/coffee production
- Extraction of natural flavours from fresh fruit
- Essential oil extraction from botanicals, herbs and spices
- Aroma recovery and preservation during production of fruit and vegetable juices/purees
- Dealcoholisation and alcohol management in wine, beer, cider and spirits production
- Deodorisation of cream and flavour management of dairy products

The new smaller model, known as the SCC100, has a throughput of 25-115 L/hr*, making it ideal for universities, R&D departments and small production runs. Three model types are available:

The new small-scale SCC100

- **The SCC100-C:** for clarified extracts and juices;
- **The SCC100-W:** for dealcoholisation of alcoholic beverages; and
- **The SCC100-S:** for slurry processing that may include coffee, tea, fruit & veg puree/pulp

* *Depending on feed product characteristics and applications*

The SCC is ideal for extracting high-quality natural flavour from mango pulp

2. The Centritherm® evaporator

The Centritherm® evaporator is the ideal technology for producing high quality concentrates of products that are heat sensitive, viscous or of particularly high value. With a residence time on the heating surface of only one second, and evaporation temperatures as low as 35ºC, the technology has minimal to no effect on colour and active constituents. The low temperatures used also ensure that no heat derived flavours are produced to alter the product's original flavour. Furthermore, its centrifugal design means it can reach higher concentrations than other evaporators and it is often used as a finisher in the evaporation process to reduce process and energy requirements downstream.

Applications of the Centritherm® evaporator include:

- High quality tea and coffee concentrates
- High quality fruit and vegetable concentrates
- Solvent removal from botanicals and oleoresins
- Solvent removal in the pharmaceutical industry
- Concentration of vitamins, enzymes and active ingredients

This thin-film evaporator is also available in a small-scale model, known as the CT1, which has an evaporation capacity of 50kg/hr* making it suitable for universities and research institutes.

* *Depending on feed product characteristics and applications*

3. The Resin Adsorbing Column (RAC)

With the growing interest in zero alcohol beverages, Flavourtech has developed the Resin Adsorbing Column (RAC). This technology has at its core, the principles of adsorption and desorption, and can be positioned downstream of the SCC to create a flavoursome no alcohol beverage without the need to add external flavours.

Flavourtech's engineers have also recently miniaturised their RAC technology, resulting in the smaller RAC1, which is perfectly suited to work with the SCC100-W. This combination is proving ideal for wine or beer research institutes working on zero alcohol projects.

India's universities and research institutes can greatly benefit from these recently developed models as they are compact, easy to use and have the ability to process multiple products. Potential clients are welcome to make use of Flavourtech's pilot plant facilities in Australia; Wageningen University in the Netherlands; Kansas City in the USA; and Highfield Tea in Bangalore. These locations each house their state-of-the-art processing technologies and offer paid trials for demonstration of process performance, validation of new product concepts, and formulation optimisation. To book a trial at one of these facilities, please contact sales@flavourtech.com, or visit www.flavourtech.com for more information.

Ultimately, Flavourtech's small-scale systems are helping to bridge academic research and real-world commercial applications, empowering the next generation of food scientists to develop superior, high-value products.

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One of Flavourtech's pilot plants for demonstration and trial purposes

Disinfection Measurement and Dosage in Bottle Washing made Easy

What happens after you've returned your bottle?

A deposit bottle is usually cleaned, disinfected and refilled around thirty, up to fifty times. One such bottle washing system is located at Maisel's brewery in Bayreuth, Germany. The disinfection panel installed there not only provides precise measured values, but also controls the optimum disinfectant dosage.

Challenge

The cleaning process begins with the bottles being emptied of residue, pre-soaked and flushed out. They are then cleaned in alkaline solutions and water baths, disinfected with chlorine dioxide and finally rinsed. The challenge here is to dose enough chlorine dioxide to guarantee reliable disinfection. And at the same time keep the concentration low enough to save costs and protect the system from corrosion.

Typical process challenges – especially all kinds of fluctuations – make chlorine dioxide measurement considerably more difficult. The ancient wisdom of Heraclitus – "nothing is as constant as change" – applies in a particular way: In the form of temperature fluctuations, fluctuations in flow velocity and irregular downtimes (for example, due to maintenance and washing cycles). In addition, short-term pressure peaks pose a risk of damage to the diaphragm cap. And there is something else that favors incorrect measured values: The high dirt load in the medium. This means that the washing liquid usually contains a lot of label residue, which contaminates the sensor diaphragm.

Measured values are the basis for the dosage. If they are incorrect, the chlorine dioxide concentration will be too high or too low. This not only results in high costs, but also puts people and machines at risk.

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Hannes Kauper (Dipl.-Ing.) at the transmitter that delivers more than just measured values
Image source: Endress+Hauser

"We were only able to develop this panel solution together because we all pulled together as partners. We have always believed in Endress+Hauser and have been very satisfied for years. I don't think it's an exaggeration to say that we now have the most stable measurement and control system in the industry," says Hannes Kauper Head of Filling and Brewing Technology Maisel Bros. Brewery.

Solution

In 2024, Brauerei Gebr. Maisel, together with Endress+Hauser, developed and installed a panel solution that makes the measuring completely self-sufficient and independent of these challenges. The result is a stable, low-maintenance and reliable disinfection measurement system that enables optimum dosage and works as follows:

1. Rinse water
2. Sample water
3. The upstream filter effectively protects the sensor from contamination and filters out all label residues. It is automatically backwashed every two hours via a fresh water valve (1) controlled by the transmitter.
4. The pressure regulator limits the pressure so that the sensor diaphragm does not rupture due to overpressure or underpressure.
5. The Flowfit CYA27 flow assembly for multi-parameter measurements with the chlorine dioxide sensor and flow measurement ensure a constantly sufficient flow for precise measurement.

The panel: Optimized for bottle washing processes in the food industry
Image source: Endress+Hauser

6. The Liquiline transmitter not only supplies the measured value, but also enables the panel with its control engineering to become a complete solution.

In the panel itself, the transmitter controls the opening and closing of the flush and sample water valves, depending on whether measuring or flushing is taking place.

In the process, it controls the dosing pump and thus enables chlorine dioxide dosing – optimized for the various operating modes (e.g. start-up, washing, rinsing, emptying or draining).

For example, the programmed solution uses the math module to regulate the dosage

Brauerei Gebr. Maisel and Endress+Hauser: Joining forces to achieve their goal. Left, Sven Müller, Deputy Head of Filling Maisel Bros. Brewery

Benefits: Safety and savings thanks to process optimization In contrast to pure inline measurement, the panel solution compensates for the typical process challenges described above. This ensures a reliable measured value and a stable process. This means that the optimum dosage can not only be determined, but also implemented directly by the control system. This safely disinfects the bottles, prevents corrosion damage in the plant and saves costs:

"Thanks to the stable measurement, we were able to reduce the target concentration and save a total of 35% chlorine dioxide." Sven Müller, Deputy Head of Filling Maisel Bros. Brewery

Image source Endress+Hauser

Maintenance optimization

This all-inclusive package and the stable conditions on the panel reduce the maintenance effort by automatically cleaning the measuring point. It improves workplace safety and eliminates the need for frequent manual rinsing. The solution enables employees without programming knowledge to set controls such as flush cycles on the Liquiline transmitter themselves. In addition, the brewery's calibration data shows that there was no sensor drift within six months. This meant that no adjustment was necessary and the maintenance interval of the sensor was significantly extended.

For further information: www.endress.com/food-beverage

Trends in the Growing Frozen Pizza Sector

By **Scott Klockow***

The frozen food market, including pizza, continues to be one of the fastest growing market sectors in food processing. Advances in freezing methods intersect with consumer trends. Consumers are seeking healthier, convenient options. These trends include increased choices of vegetables and plant-based proteins. Traditional toppings remain popular while niche pizza toppings and styles of crusts are ever expanding. Research and development teams continue to build on new flavors and toppings.

Brussel sprouts, beets, arugula, spinach, zucchini, and yellow squash are just a few on-trend toppings. Cauliflower crusts are also at the forefront. Alternative textured plant proteins take center stage and appear on pizzas as shreds, crumbles, or dices in place of traditional meat selections. The category of cheese toppings is ever growing including goat cheese, feta, and non-dairy, plant-based options.

When considering the purchase of new capital equipment, processors need to identify the flow of their current system. If creating a new line, make sure each station will work seamlessly with the next. Safety and flow should be fully analyzed. Working with a line company offers an additional amount of security.

In addition to choosing the proper cutting machine, ask about spare parts availability, maintenance, and determine the degree of support after the sale. Urschel offers support to every customer for the long life of their cutting machinery.

Urschel technology delivers precision and expertise to pizza manufacturers. With the extensive ability to effectively cut a gamut of shapes to provide precision cuts within the targeted specifications. Many ingredients go into creating different styles of frozen pizza and ingredients vary depending on product characteristics. For toppings, fruits and vegetables rely on gentle cutting methods, whereas alternative proteins require more aggressive cutting methods. In addition, reduction of ingredients for sauces and crusts down to micro-dimensions is necessary to produce the ideal frozen pizza.

As a powerhouse developer of cutting solutions, Urschel identifies the proper machine to pair with the desired outcome. With slicers,

dicers, milling equipment, and all types of cuts, Urschel offers boundless reduction opportunities to frozen pizza processors. This may translate into a new beet sauce or cauliflower flour crust. Urschel size reduction equipment paves the way for processing capabilities.

Urschel partners with customers to optimize their productivity. Test lab technicians identify new cuts that bring true benefits to the processors that work with Urschel. From half-moon zucchini slices to bow-tie beet cuts, unique looks abound to help processors standout in the competitive frozen pizza industry.

Some of the key issues processors are facing include adequate labor and staffing and require more in a machine design. Through improved technology, driven by engineering and manufacturing advancements, the processor saves time, reduces staffing requirements, and improves capacity and quality of product output.

Customers are demanding more in a design than ever before. Cutting principles are more precise to produce tighter, increased in-spec results, dedicated to increasing usable product. Components are constructed with ease-of-use elements, such as built-in handles, while also being able to withstand rugged production environments. Tools that accompany machines are also designed to expedite routine procedures. It all relates to time savings and cost savings.

Customers are looking for a machine with components that work with their fast-paced line. Small and large companies want a robust machine that will hold precision slice tolerances throughout production runs with guarantees of parts and service when they need them. The ability to make changes 'on the fly' to be responsive to the needs of their environment.

Urschel incorporates sanitation, cleanability, and durability which are of great importance in today's designs. Sloped stainless steel surfaces prevent pooling and assist in sanitation practices. Hinged panels prevent sheet metal from being rested on the floor, while providing full access for cleaning. The cutting zone is completely separate from the mechanical zone to negate cross contamination. Durability of knives and components is essential. Removable spindle carriages aid in sanitation. Higher cleanability saves time with washdowns and assists in profitability.

Urschel offers complete support over-the-phone, in-person plant visits, or live remotely. Urschel's significant ongoing investment in the global infrastructure of our company has resulted in clients receiving expedited parts and peace of mind knowing their local office is there for complete support in terms of maintenance and training for the long life of their cutting equipment. Urschel speaks the language of food processing AND the local language, so important details in customer expectations are met.

New for the emerging alternative protein market, the DiversaCut® series, M6 Dicer, and the M VersaPro® (MVP) Dicer offer aggressive cutting parts and feeding spindles created to overcome products that are normally difficult to process. These cutting methods also effectively reduce traditional cooked meats. Also new in meat processing, the Affinity large dicer with built-in log precutter for an all-in-one log dicing solution.

The Affinity® series is also used for cheese dicing, so cheese can be accurately measured and dispensed on pizza. The large Affinity® Dicer along with the smaller footprint of the Affinity Integra-D. For cheese shredding, the MicroAdjustable® CC series Shred Head (SH-14) offers expedited knife changeovers. Urschel machinery maintains more precise control of the shred thickness, so processors use less cheese per ounce while maintaining a full coverage appearance. This relates to better control in cheese melting and cost savings for the processor. The MicroAdjustable head, sanitary in design, is U.S.D.A. accepted. Other U.S.D.A. accepted offerings include the CCX-D cheese shredder. Whether shredding or dicing cheese or plant-based 'cheese', Urschel cutting solutions are ever evolving to meet the flexible needs of production lines.

Thousands of cutting applications exist that Urschel size reduction machinery is actively involved. The Comitrol® Processor line of machinery is unique to our company. As with all reduction machinery we engineer and manufacture, all key components are crafted, constructed, and assembled under one roof at Urschel, so strict quality standards are enforced. The size reduction heads employed in the Comitrol line achieve particles down to micro-dimensions. Potential applications include sauces, pastes, slurries, granulations, rice cuts, crumbles, powders, and flours. Comitrol reductions continue to be a sought-after resource for the frozen food industry. The word "Comitrol" means controlled comminution.

The E TranSlicer® Cutter (ETRS-C), DiversaCut 2110A® (DCA) and Sprint 2® (SPR2) Dicers feature built-in discharge conveyors to facilitate dispensing cut product into totes. The built-in conveyors assist in effectively capturing slivered, small cuts of fruit and vegetable products such as leeks, onions, tomatoes, or peppers to promote gentle and complete discharge from each machine. In addition to the new conveyor discharge option, the E TranSlicer may also be equipped with a bias slicing option.

Customers are encouraged to take part in a free-of-charge test cut of their product to determine the optimum Urschel machine for their cutting application. This beneficial service may be scheduled through their local Urschel contact.

About the author:
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For further information: www.urschel.com

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The Future of Coffee: Innovations That Could Revolutionize the Industry

By **Roasted Origins Coffee Co.**

At Roasted Origins Coffee Co., we are relentless in our pursuit of the perfect cup of coffee. As dedicated coffee enthusiasts, we are always exploring new techniques, technologies, and ideas that can elevate the entire coffee experience. In this blog, we will brew up some of our favorite inventive concepts that have the potential to shape the future of specialty coffee. Let's dive in!

Bean-to-Cup Precision

One area ripe for innovation is improving precision in the bean-to-cup process. Even minute differences in factors such as water temperature, brew time, grind size, and extraction yield can dramatically impact the flavor of the final cup of coffee. We envision a future where café owners and home brewers alike can achieve digital precision when brewing.

Smart sensor technology can now monitor water temperature and flow rate to help baristas dial in the optimal brewing parameters. Mobile apps can guide homebrewers through calibrating their equipment and replicating the same recipe daily. Customizable brewing hardware allows users to adjust every variable to match the unique properties of a particular coffee batch or their personal taste preferences. With these kinds of innovations, we look forward to unprecedented consistency and control over the brewing rituals we cherish.

Adaptive Roasting Technology

Crafting the perfect roast profile is an art that we obsess over here at Roasted Origins. Tiny tweaks to the roasting time or temperature can draw out dramatically different flavors in a coffee. We want future roasting machines to make personalized roasts for specific beans easy and consistent.

Intelligent roasting technology could analyze the chemical composition, moisture content, and other attributes of a batch of green coffee beans and then adapt the roasting approach accordingly. We envision customizable profiles where the roaster can input the desired flavors and complexity they want to achieve, and artificial intelligence handles optimizing the roast to match those goals. This would allow roasters to easily experiment while eliminating human error and inconsistencies.

Immersive Tasting Experiences

As coffee lovers, we are always searching for new ways to engage our senses and enrich the drinking experience. Some technological advancements we are excited to see integrate the tactile, visual, and auditory realms with the taste of coffee to create immersive experiences.

For example, customizable mugs could respond to the temperature of the coffee and change colors, patterns,

or textures. Coffee shops could offer augmented reality modules where you view the orchards and farmers behind the coffee through a tablet as you drink. Soundscapes or playlists designed to pair with particular coffee flavors would further enhance the experience. We look forward to innovations that celebrate the joy and multi-sensory nature of coffee.

Smart Storage Solutions

To brew incredible coffee, you have to start with fresh, high-quality beans. Innovation in storage solutions that prolong freshness could dramatically improve coffee quality.

We imagine high-tech, vacuum-sealed containers that remove oxygen exposure from the equation. Smart canisters could contain sensors that notify the user when the coffee beans start losing their prime. They could even adapt to optimize humidity, airflow, light, and temperature day to day.

For cafes with high volume, an automated system that rotates and dispenses beans on a precise first-in-first-out basis would help eliminate waste from expired coffee. In general, technology that analyzes environmental variables and adapts in real-time to keep coffee beans in their ideal state has enormous potential.

Microlot Tracking Technology

As advocates of fair trade, farm-direct coffee, Roasted Origins goes to great lengths to develop relationships with growers worldwide. We love spotlighting exceptional microlots, tiny batches from a single farm or harvesting period. However, better supply chain tracking technology is required to give recognition to individual smallholder farmers for their hard work.

Blockchain or radio frequency identification (RFID) tech could trace an individual bag of coffee beans back to the exact plot of land and farmer behind it. Shoppers would know the origin story and fair compensation would reach the producers. This model has already seen success in the wine industry. We envision a future where coffee farmers also get rightful acknowledgment and customers can see the full seed-to-cup journey.

Modular Commercial Equipment

Operating a coffee shop involves an intricate choreography of machines, grinders, espresso bars, and storage. Innovations in modular, customizable equipment would make configuring and updating a cafe much more flexible.

With magnetic modular shelves, dispensers, brewing heads, and accessories, owners could rapidly rearrange workflows. Smart technology that self-calibrates would also allow new equipment to be swapped in seamlessly. We envision cafes having the versatility to reorient operations from a sit-down cafe to a grab-and-go counter to a specialty coffee bar all in the same day. This would enable businesses to continuously adapt to meet demand.

Waste-Upcycling Solutions

Here at Roasted Origins, we aim to run our operations sustainably. That's why we are eager to integrate solutions that upcycle byproducts and waste into usable material streams. An estimated 80% of the coffee cherry is wasted during processing. The nutrient-rich pulp left over after wet processing has potential for conversion into compost, biogas, or biofuels.

Spent coffee grounds remaining after brewing are also packed with antioxidants and nutrients. Innovators are finding ways to convert them into essential oils for cosmetics, edible mushrooms, and ingredients for recipes. Even coffee chaff left over after roasting can potentially be used to enrich soil. We applaud these models of the circular economy that ensure this precious crop in its entirety gets utilized.

Coffee Connection Apps

In our interconnected world, innovations in digital technology can help foster community around coffee. Mobile apps could facilitate coffee drinkers finding and connecting with one another based on shared flavor profiles and recommendations. Geo-location based services could notify users when they are near a highly rated café or a specialty roaster's shop.

Immersive online coffee courses and tasting experiences could also help coffee enthusiasts expand their knowledge and skills from anywhere. We envision an app-enabled coffee community where people trade brewing tips, review cafes, earn loyalty rewards at local roasters, and share their coffee journeys.

Some other ideas for app-based innovation include:

- A digital coffee passport that tracks the origins of coffee you've tried and helps you discover new ones from around the world. Users could collect virtual stamps and badges for sampling different coffees.
- An AI-powered coffee recommendation engine that gets to know your preferences and suggests new beans and brewing recipes to try. The more data it collects, the more personalized the suggestions become.
- Augmented reality features that let you view the journey of a particular coffee from crop to cup. You could tour the farm in Colombia and processing mill before watching beans get roasted live through your phone.
- A barista training app with videos demonstrating proper techniques and recipes. Budding home baristas could access training modules from expert roasters.
- Digital coffee festivals and tastings where you can join live cupping sessions, view demonstrations, ask questions in real-time chat, and purchase featured coffees.
- Subscription services that match you with a personalized bean shipment each month from roasters around the world. The app would handle preferences, ratings, and orders.
- A coffee marketplace app for directly connecting roasters and consumers. You could order beans from coveted microlots at specialty roasteries nationwide.

The list goes on!

Hydroponic Coffee Plants

Finding ways to grow coffee that transcends geographical limitations would open up specialty coffee to wider audiences. We envision a future where coffee plants can be cultivated locally through hydroponic greenhouses in urban environments. With precisely controlled variables like light, humidity, soil chemistry and nutrients, high-quality coffee could be grown by entrepreneurs and boutique roasters anywhere. Tropical farms would no longer have a monopoly over cultivation. Customers could visit greenhouses to see their beans growing firsthand. This innovation could make fresh-roasted gourmet coffee accessible to all.

Coffee Education Academies

Education has the power to uplift specialty coffee communities worldwide. We envision a future of coffee education academies that create opportunities in producing origins. Hands-on curriculum tailored to young students would instill pride and preserve generations of coffee farming knowledge. Enrollees would gain skills to improve harvest quality and business operations, enabling them to earn more from their high-grade coffee. Partnerships with roasters and cafes abroad could provide top graduates with apprenticeships and global connections. These academies would secure a brighter future for coffee-centered communities.

Coffee Crop Drones

Precision agriculture powered by drone technology will transform coffee farming. Fleets of drones can scan acres of coffee cherries daily to detect ripeness down to an individual tree. Cloud-based

systems then prescribe the optimal selective harvesting pattern for farmers. Other drones specialize in spraying pesticides and fertilizers directly onto affected plants only. This precision greatly reduces chemical usage. Onboard cameras also monitor for threats like fungi and insects early. The coffee fields of the future will leverage drones to maximize quality and sustainability.

Bean-Harvesting Robots

The future of coffee harvesting will be automated. As labor shortages plague coffee regions, fleets of dexterous picking robots will take over. Equipped with AI vision, these robots can identify perfectly ripe cherries for selective harvesting. Their nimble robotic arms gently pluck only the optimal cherries, minimizing unripe green beans. Engineers continue refining the bots' sensitivity to match human touch. As the technology improves, coffee harvests worldwide will reach unprecedented consistency and quality. Farmers can redirect their focus to cultivation while robots handle the meticulous picking.

Innovating the Bean-to-Cup Journey

The future of coffee is filled with exciting potential. As lovers of the bean, we at Roasted Origins Coffee Co. will continue to seek out new innovations and technologies that can elevate every step of the coffee experience. Whether it's revolutionizing how coffee is cultivated, roasted, brewed, or enjoyed, there are always opportunities to deepen human connection through coffee. We cannot wait to see these visions materialize and transform how the world appreciates this versatile beverage. The golden age for coffee enthusiasm is still unfolding. We are proud to be at the forefront as both pioneers and partners in driving progress. If you share our passion for coffee, join us on this journey into the future. The next revolution in coffee awaits.

Beyond Reheating: How Microwaves are Transforming Modern Food Processing

By **Yash Nawale, Priyanka & P. Barnwal***

Introduction

Microwave energy has emerged as a powerful tool in modern food processing, changing the way we cook, preserve, and package food. What began as an innovation for home kitchens is now driving large-scale industrial applications—from drying fruits to sterilizing ready-to-eat meals. With rising demand for nutritious, minimally processed foods, microwave processing offers a perfect balance of speed, safety, and sustainability.

The Science of Microwaves

Microwaves are electromagnetic waves, typically operating between 300 MHz and 300 GHz. In food processing, the most common frequencies are 2.45 GHz (for domestic and pilot-scale use) and 915 MHz (for industrial operations). When microwaves interact with polar molecules such as water or fat, they cause them to oscillate rapidly, producing heat through molecular friction. This volumetric heating ensures that food warms evenly throughout—unlike conventional methods that heat from the surface inward.

Industrial Applications of Microwave Technology

1. Drying and Dehydration

Microwave drying drastically shortens drying time and reduces energy consumption. It helps preserve natural color, aroma, and nutrients in foods such as fruits, vegetables, herbs, and spices.

Advanced systems combine microwaves with vacuum or infrared heating to achieve high-quality dried products. For example, microwave–vacuum drying is used for heat-sensitive foods like strawberries and mint leaves.

2. Heating and Cooking

In industrial kitchens, microwaves allow rapid cooking of convenience foods while retaining moisture and flavor. Compared to boiling or frying, microwave cooking minimizes nutrient loss and oxidation. Modern food plants use conveyor-based microwave tunnels for baking cakes, reheating ready-to-eat meals, and preparing snack foods.

3. Pasteurization and Sterilization

Microwave-assisted pasteurization and sterilization have become vital for ensuring food safety. These systems can heat foods in sealed containers, maintaining sterility without affecting texture or color. Continuous-flow microwave sterilizers are now used for soups, sauces, milk, and baby foods. The technology reduces processing time by up to 80% while saving significant amounts of water and energy.

4. Thawing and Tempering

Microwave thawing provides fast, uniform defrosting of frozen meat, poultry, and seafood. It minimizes drip loss and prevents microbial growth. Large meat processing units employ this technology before grinding or cutting operations, ensuring consistent product quality.

5. Blanching and Puffing

Microwave blanching quickly inactivates enzymes in vegetables like peas and spinach, preserving their green color and crunch. In snack production, microwave puffing generates light, crispy textures in cereals and extruded snacks.

Sustainability and Energy Efficiency

Microwave systems are far more efficient than traditional steam-based methods, which often operate below 20% efficiency. Since microwaves generate heat only within the food, there is minimal energy loss. Moreover, microwave plants can operate on renewable electricity, eliminating the need for fossil-fuel boilers. These systems also require less water, making them ideal for sustainable and eco-conscious food production.

Modern Microwave Equipment and Indian Developments

India has been quick to adopt microwave technology for food processing. Several national and international players are contributing to this shift:

- **SAIREM (France) and Ferrite (USA)** supply advanced microwave dryers and sterilizers for spice and ready-meal industries in India.
- **Püschner (Germany) and Ampleon (Netherlands)** have collaborated with Indian firms to install continuous-flow microwave heating systems for dairy and beverage processing.
- **Indian manufacturers such as Asha Microwave Technologies and Sairem India Pvt. Ltd.** provide microwave dryers for spices, dairy powders, and herbal products.
- **Research institutions like ICAR–NDRI and CFTRI Mysuru** are developing hybrid microwave–infrared and microwave–vacuum systems for milk pasteurization, curd drying, and ghee clarification.
- **Startups and automation firms** are introducing AI-based microwave dryers and sensors that adjust energy levels dynamically for optimized drying.

Expanding Applications Across Food Categories

- **Fruits and Vegetables:** Used for drying, blanching, and pasteurization while preserving nutrients and color.
- **Meat and Seafood:** Rapid, uniform cooking and thawing minimize bacterial growth.
- **Dairy and Beverages:** Continuous-flow microwave systems for milk, soups, and juices ensure microbial safety with minimal thermal damage.
- **Bakery and Snacks:** Microwave baking and puffing provide faster production cycles and improved crispness.

Challenges and the Road Ahead

Although microwave processing offers many benefits, challenges remain—particularly in achieving perfect uniformity in large-scale systems and developing microwave-compatible packaging. However, with ongoing research and AI-driven power control, these limitations are being rapidly overcome. The integration of hybrid systems (microwave with radio-frequency or infrared) holds promise for even greater efficiency and precision.

Conclusion

From speeding up drying and cooking to ensuring safer, more sustainable food production, microwaves have revolutionized the food industry. In India, their adoption across dairy, meat, and fruit sectors is a testament to how science can power innovation. As equipment advances and costs drop, microwave technology is poised to become a cornerstone of modern, eco-friendly food processing.

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Power Build's entire gearbox and geared motor portfolio is engineered with energy optimization at its core. Whether it's the **Series M Helical Inline Geared Motors,** known for their compact design and high efficiency, or the **Series K Helical Bevel Geared Motors,** offering torque up to 50,000 Nm with minimal energy loss, each product is built to maximize output while reducing unnecessary power draw. These solutions are precision-designed to minimize friction, vibration, and wear three major contributors to energy inefficiency and mechanical failure.

One of the most effective ways Radicon supports sustainability is through its gear systems' **high mechanical efficiency,** which directly contributes to lower electricity consumption in continuous operations. For example, the **Series C Heli-Worm and Series F Parallel Shaft Geared Motors** are designed to deliver optimal performance even under varying load conditions, reducing the stress on motors and associated systems. This not only conserves energy but also lowers the carbon footprint of plants over time.


PBL Image

Moreover, Power Build's **planetary (Series PL)** and **worm gear (PBWR)** series contribute significantly to space-saving, heat reduction, and maintenance-free operations all of which are key to sustainable plant design. Many of these gearboxes are pre-filled with high-grade lubricants and designed for long maintenance cycles, ensuring reduced downtime and lower waste generation over the life of the equipment.

To complement its mechanical excellence, Radicon also offers the **PBL VFD Series (Variable Frequency Drives)** a modern, electronic solution that brings intelligent speed and torque control to the table. These drives allow motors to operate at optimal speeds, cutting down on excess energy use during startup, operation, and load variations. The result is a finely tuned drive system that aligns with green manufacturing goals.

Lastly, through extended equipment life cycles, Radicon products inherently reduce the need for frequent replacements and resource consumption. Gear units like the **Series J Shaft Mounted Reducers** and **Roloid Gear Pumps** are crafted with durability and long-term efficiency in mind, further reinforcing the company's commitment to sustainable industry practices.

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Transforming the Food Supply Chain: how Reusable Packaging Solutions touch Every Meal

In a world where supply chains are the invisible lifeline delivering food from farm to fork, the pressure on companies to have a compliant, food safety fit-for-purpose solution, increase efficiency, cut waste and boost sustainability has never been greater. Tosca, a global leader for 100% reusable and recyclable plastic packaging and pooling solutions, plays a crucial role in reshaping the modern food supply chain, ensuring that every meal begins with smarter logistics and ends with satisfied, sustainability-conscious consumers. From producers and processors to distributors and retailers, Tosca's solutions touch every stage of the journey, supporting safer handling, reducing waste, and helping businesses meet rising demands for performance and responsibility. In today's food supply chain, the right packaging choices are proving more essential than ever.

"Tosca's mission is to eliminate waste and unlock hidden value across the supply chain," says Jurgen Van Roy, Vice President of Supply Chain. "From reducing packaging waste to increasing the durability and safety of assets, our model enables businesses to operate more sustainably while enhancing their operational performance."

Safer, cleaner, smarter: packaging built for food integrity

Today's consumers care not only about what they eat but also about how it gets to their table. Transparency, traceability and sustainability are no longer optional.

Tosca's technology-driven solutions support these goals by enabling clear traceability of products and reducing food waste through more stable and hygienic load carriers. Marco Gonzalez, Managing Director of Central Europe Downstream, notes: "Customers want to know that their food is safe and sustainably sourced. Our reusable plastic pallets and crates are not only more durable and hygienic, but also designed to prevent damage and contamination. That's critical for preserving food safety and quality."

By helping retailers eliminate food waste resulting from damaged packaging or spoilage, Tosca plays a crucial role in meeting ESG goals and reinforcing consumer trust. Whether it's meat, dairy, produce, or packaged goods, Tosca provides customisable solutions that are aligned with each product's unique needs and handling requirements.

Driving efficiency from the ground up

Food supply chains are complex, spanning thousands of kilometres and involving multiple stakeholders. At every link, Tosca's packaging solutions provide an infrastructure that is both standardised and flexible, allowing retailers and producers to scale without compromising quality.

One of the clearest benefits of Tosca's approach is its impact on logistics. By using foldable, stackable, and standardised assets, customers can significantly reduce transportation costs and maximise the use of truck space. More impressively, Tosca's pooling system slashes "empty miles" – trips where trucks return with unused capacity.

Vincent Nagels, Managing Director of Upstream, points to a real-world case: "We had a customer in Denmark sending pallets to Spain, and instead of returning those pallets empty, we now collect them locally and deliver them to another customer in Spain. This simple switch has led to a huge reduction in carbon emissions and transport costs."

Tosca's customers also benefit from improved asset visibility and inventory control. In markets such as Central Europe, where Tosca's RFID and IoT technologies are already in place, customers have access to real-time tracking data that enhances pool transparency and reduces the need for buffer stock, lowering working capital requirements. This leads to greater predictability, fewer surprises, and more strategic planning. From passive RFID tracking to active IoT monitoring, Tosca's asset tracking capabilities are designed to evolve with customer needs. The company continues to invest in these technologies as part of its broader commitment to smarter, more responsive supply chains.

Sustainability through circularity: Tosca's closed-loop approach

Reusable packaging is inherently sustainable, but Tosca takes it a step further by embedding circular economy principles into every layer of its business. Instead of relying on single-use packaging that ends up in landfills and drains resources, Tosca's plastic-based assets are designed for durability, and when they reach the end of their usable life, they are recycled and reborn.

"Our entire model is circular," says Jurgen Van Roy. "We collect assets, inspect them, repair if needed, and clean them thoroughly with food-approved detergents. If an asset is beyond repair, it's recycled and reintroduced into the system. No plastic is wasted, and the loop is fully closed."

This closed-loop approach results in tangible environmental benefits. Tosca's pooling model reduces packaging waste, cuts down carbon emissions, and helps customers comply with evolving legislation across Europe, such as the upcoming Packaging and Packaging Waste Regulation (PPWR).

A powerful, complete solution across the supply chain

What sets Tosca apart is its ability to apply this circular approach across the entire supply chain, offering a complete, reusable packaging solution from producer to retailer that delivers both operational value and environmental benefits.

As Vincent Nagels explains, Tosca is vertically integrated, which means it manages all the value contributors across the entire supply chain. "We are uniquely able to combine

our upstream and downstream products to create a powerful, effective returnable packaging for our customers, ranging from small-medium companies to one of the largest European FMCGs and retailers."

Innovation that never stops

Innovation is at the heart of Tosca's identity. With a dedicated team focused on product design, material science and digital technologies, the company continues to push the boundaries of what reusable packaging can achieve.

"We're not just reacting to change; we're anticipating it," says Jurgen Van Roy. "Our innovation team looks at how to improve the strength and durability of assets, how to make materials more sustainable, how to embed technology like tracking to create smarter, more responsive systems."

Automation is another area where Tosca is anticipating evolving needs. As warehouses become increasingly automated, the consistency and reliability of plastic pallets become critical. As Marco Gonzalez explains, "plastic load carriers are much more suitable because they maintain their shape, weight, and integrity across multiple uses, which is essential for reliable handling by machines and AI systems."

Laurent Le Mercier, EMEA President, Tosca

Jurgen Van Roy

A trusted partner in transformation

Tosca's value extends beyond products. At its core, the company operates as a strategic partner, working closely with customers to assess their needs, identify opportunities for efficiency, and develop long-term solutions. This collaborative approach sets Tosca apart in a crowded marketplace.

"Customers approach us because they see us as experts in reusable plastic packaging. They come to us for our insights. Whether it's reducing costs, increasing food safety or adapting to new legislation, we work hand-in-hand to find the best way forward," says Vincent Nagels

Laurent Le Mercier, EMEA President, concludes: "We value long-term relationships with everyone in the supply chain – from carriers and retailers to third-party wash centres and recyclers. It's only through close partnerships that we can continuously improve and evolve together."

As the pressures on the global food supply chain grow, Tosca's reusable packaging solutions become vital and transformative.

About Tosca

Tosca is a global leader in reusable plastic packaging and performance pooling solutions. Committed to driving sustainability and innovation across industries, Tosca focuses on supplying innovative packaging solutions for a wide variety of industries.

Tosca's end-to-end pooling capabilities offer a smart and sustainable solution for growers, suppliers, and retailers. By utilising reusable containers and pallets, Tosca not only reduces costs but also enhances supply chain performance.

For further information:
www.toscaltd.com

HRS process systems

Shaping the Future of Value-Driven Dairy Processing in cheese, paneer (cottage cheese), yogurt and whey segment

INTERVIEW

*In the evolving landscape of dairy, value-added segments like cheese, paneer (cottage cheese), yogurt and whey are driving demand for advanced processing solutions. We spoke with **Mr. T. K. Radhakrishnan, Vice President – Food Systems Business Unit at HRS Process Systems Ltd.,** to understand the technological advancements, sustainability imperatives and innovations shaping the industry.*

Q1. WHAT ARE THE BIGGEST TECHNOLOGICAL ADVANCEMENTS IN THERMAL PROCESSING SPECIFICALLY SHAPING THE FUTURE OF CHEESE AND YOGURT PRODUCTION?

A: Thermal processing has evolved far beyond conventional pasteurisation. Today, we see advancements such as high-temperature short-time (HTST) systems, thermisation for microbial control while retaining nutritional properties. Precision temperature profiling is another key development, enabling processors to fine-tune texture, viscosity and culture activity in cheese and yogurt. These improvements not only ensure consistent quality but also allow manufacturers to innovate with specialty and probiotic-rich products.

Q2. HOW ARE DAIRY PROCESSORS BALANCING PRODUCT QUALITY AND FOOD SAFETY WITH THE NEED FOR ENERGY EFFICIENCY AND SUSTAINABILITY?

A: The balance comes from process integration and smarter energy recovery. Heat recovery systems allow reuse of thermal energy, significantly reducing fuel and utility costs. Low-temperature long-time (LTLT) alternatives are also making a comeback, particularly for specialty and artisanal products, without compromising safety. The core challenge is achieving microbial safety and extended shelf life while using fewer resources, and that is exactly where engineering design makes the difference.

Q 3. CAN YOU DESCRIBE HOW YOUR TURNKEY PROCESS LINES ARE DESIGNED TO ENSURE REGULATORY COMPLIANCE WHILE IMPROVING OPERATIONAL EFFICIENCY?

A: At HRS, compliance with EHEDG, 3-A Sanitary, FDA, ATEX, TPED and HAZOP study is embedded in the design of our turnkey solutions. Hygienic equipment design is critical — smooth finishes, minimal dead legs and fully automated CIP (clean-in-place) systems ensure food safety while reducing downtime. Traceability is enabled through advanced control systems, giving processors real-time monitoring and documentation. By integrating these features, our cheese, paneer (cottage chest), yogurt and whey process lines deliver not just compliance but also improved operational efficiency, reducing waste and enhancing throughput.

Q 4. WITH GROWING CONSUMER DEMAND FOR VALUE-ADDED DAIRY PRODUCTS, WHAT PROCESSING CHALLENGES ARE MOST COMMON — AND HOW IS THE INDUSTRY ADDRESSING THEM?

A: In cheese and yogurt, culture management, viscosity control, whey fractionation and yield optimisation are the most frequent challenges. For instance, ensuring probiotic viability in yogurt or managing curd firmness in cheese requires precise process control. The industry is addressing these with advanced membranes, centrifugal separation, enzymatic aids, and digital formulation control systems. The emphasis is on delivering consistent quality while enabling product differentiation, such as probiotic yogurts, specialty cheeses, and whey-protein enriched beverages.

Q 5. WHAT ROLE DOES EQUIPMENT CUSTOMISATION AND MODULARITY PLAY IN HELPING DAIRY COMPANIES PIVOT RAPIDLY FOR NEW SKUS?

A: Flexibility is crucial in today's dairy sector. Modular and customisable equipment allows processors to scale up from pilot to commercial production seamlessly. For example, a yogurt line can be adapted for probiotic or flavoured variants with minimal changeover time. Similarly, flexible automation recipes and sanitary fittings support faster line adjustments and reduce downtime. This adaptability is vital for companies introducing new SKUs to meet changing consumer demands in cheese, paneer (cottage cheese), yogurt and whey-based products.

Q 6. LOOKING AHEAD, WHAT TYPES OF INNOVATION WILL MOST HELP DAIRY COMPANIES REMAIN COMPETITIVE IN BOTH DOMESTIC AND EXPORT MARKETS?

A: I see three areas of innovation driving competitiveness. First, processing technologies — from advanced thermal systems will shape efficiency and product quality. Second, digital process control will give manufacturers real-time insights for yield optimisation, energy reduction and traceability. Finally, waste-to-value solutions, particularly for whey, will be transformative. Instead of being treated as a by-product, whey can be valorised into high-value protein powders, beverages and nutraceutical ingredients. Together, these innovations will enable dairy companies to expand their product portfolios, reduce costs, and compete more effectively in global markets

To know more about our range of products and technology in dairy process engineering, Let's connect with our team of experts.

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Indian Ice Cream Expo 2025: Key Takeaways on the Indian Ice Cream Industry

The Indian Ice Cream Expo 2025 was held from 6th to 8th October, 2025 at Yashaboomi Dwarka. The Indian Ice Cream sector that was once a novice has now culminated into an Industry of its own with technological advancements, packaging innovations, new and exciting flavors, ingredients, premium concepts, and more. The Indian Ice Cream Market is one of the fastest growing markets that is only set to grow for years to come.

IICE hosted International and Indian Exhibitors, engaging with each other and trade visitors to accelerate the market further. The show consisted of a an open seminar hall that included talks on flavors, ingredients, and industry insights of ice creams. The trade show uncovered some fascinating insights about the Indian Ice Cream Industry.

In the last five years, ice cream market has transitioned from a seasonal market to an all year round market in India. This has specially been pertinent in the post - covid years. In an interaction with Ms. **Avantika Dhabale, R&D Manager of Vadilal Industries Limted at IICE,** she shared her insights on this paradigm shift in the Ice Cream Market and how her off season sales have been going well recently.

This change has significantly expanded the scope of the market, removing the seasonal barriers and inspiring the industry to find more fitting flavors and styles based on different seasons. Ice cream as a dessert and even as snack remains popular throughout the year in India.

At IICE, the presence of chefs and live demonstrations was highly evident. The art, craft, and business of ice cream has been isolated for the longest time and not known in the mainstream for the longest time. To witness chefs demonstrate the work that goes behind the creation of ice creams in the B2B exhibition space shows that the Indian Ice Cream Industry has come a long way and is giving more representation to chefs to showcase their work and inspire brands to collaborate with them.

The Indian Ice Cream Market

At present, the Indian Ice Cream Market does not exist in isolation. Despite the Industry rising as an individual entity, its speciality of blending into other sectors is helping it grow exponentially. Ice Cream is a part of the sweets market as well as the snacks market. Chocolate and Mithai exhibitions have ice cream companies participating in their trade fair. Ingredient companies actively participate in ice cream exhibitions. American Pecans had a booth at IICE. This blending nature is not just good for businesses but also the quality and level of ice creams we can create in the future.

In an interaction with **Vinod Rajasekharan, VP Global Sales and Marketing,** he explained the impact of GST changes on the Ice Cream Industry. The reduction in GST rates has bolstered enthusiasm across the supply chain, motivating stakeholders to perform better and contribute to the sector's sustained expansion. The purchasing power of the customers will go up and this will help the industry's growth tremendously.

Moreover, a variety of booths displayed the emergence of new premium concepts that have improved the taste of ice cream, showcasing progress in R&D. The ingredients, R&D, and packaging segments are thriving, driven by experimentation, customization, and technological advancements. However, machinery development remains an area that needs stronger support to keep pace with the sector's evolving needs and creative aspirations.

Flavour Trends at IICE 2025: Tradition Meets Innovation

The exhibitors at IICE 2025 showcased a vibrant array of new trends, flavours, and formats, from Mochi ice cream inspired by Indonesia to Faluda ice cream by Stonefield Flavors, innovative creations from Barry Callebaut, sugar-free kulfi, and more. The expansiveness of innovation was evident not only among exhibitors but also across both established and emerging brands.

Mainstream Flavour Evolution

The rise of flavours such as Pistachio, inspired by the viral pistachio chocolate trend from Dubai reflects how quickly India adapts to global tastes. Alongside health-conscious sugar-free options, protein-infused and even savoury ice creams are gaining popularity. Indian consumers are also embracing frozen treats that balance novelty with nostalgia. While traditional flavours like pista and faluda continue to hold their ground, the Indian market now proudly offers a diverse flavour portfolio that sets it apart globally. Flavours like hazelnut and strawberry have also become everyday favourites for many.

Harmony Between the Traditional and the New

Interestingly, there is no competition between traditional and modern flavours, both segments are thriving in parallel. Traditional brands are experimenting and evolving, while premium and niche players are carving their own distinctive identities. A notable example is N.K., which uses a butterscotch ball as a base and layers it with diverse flavours, textures, crunch, and toppings to create its own signature experience.This focus on innovation, authenticity, and craftsmanship is emerging as the true recipe for long-term success in the ever-evolving ice cream industry.

Blending with International Flavors

In an interaction with Ghofar Eristiwara, International Trade Supervisor of Aice, an Ice Cream Manufacturing Company in Indonesia, he shared insights on the South East Asian market and their take on the Indian Market.

He said " Basic reason to tap into the Indian Ice Cream Sector is the vast population and the sheer surprise in seeing new local brands in India that keep popping up in the market. It is a good opportunity. With their quality and very less price, you can enter the market and establish yourself in India."

"The Ice Cream Market in Indonesia is very different from India. The Indonesia ice cream is usually sticks ice cream. With their Asian inspired base and flavors, bringing new face of ice cream to India is idealic. Mochi ice cream is unique - new speciality in India. Indians have very different taste compared to Indonesia, Singapore, and South East Asian countries. This will be an exciting addition"

In the status quo, popular culture is further inspiring the new generation to experiment more which is enhancing the market and enabling new markets to enter. India's adaptability and openness to new flavors has opened doors for collaboration with different markets.

Overall, the Ice Cream Industry is becoming a stronger sector in India and opening more paths for collaboration, success, and consumer satisfaction.

Global and Indian F&B Stakeholders Converge at Fi India & ProPak India 2025 to shape the future of food

- *India's Premier F&B Ingredients and Packaging Shows concluded successfully in Delhi NCR, bringing Global F&B and Packaging Innovation under one roof*
- *Over 15,000 professionals from 50+ countries converged at India Expo Mart from 3rd–5th September 2025*
- *India's food processing sector accounts for 7.7% of manufacturing output and supports over 7 million jobs—strengthening the industry's economic impact*

The 19th edition of Fi India, co-located with the 7th edition of ProPak India, concluded successfully from 3rd to 5th September 2025 at India Expo Mart (IEML), Delhi. The shows brought together stakeholders from across the food ingredients, processing, packaging, and supply chain ecosystems, offering a dynamic platform for collaboration and innovation. With strong international participation, 340+ exhibitors, and over 15,000 professionals in attendance, the event facilitated high-value sourcing, partnerships, and investments. Reinforcing its position as a key enabler of growth, the platform continues to shape the future of one of the world's fastest-growing F&B markets.

The prestigious inauguration ceremony was graced by the esteemed panel of industry leaders and government representatives, including **Dr. Prabodh Halde**, Chairman, Chamber for Advancement of Small and Medium Businesses; **Dr. Dinkar B. Kamble**, President, AFST Delhi; **Mr. Nilesh Lele**, President, Chamber for Advancement of Small and Medium Businesses; **Mr. Hitesh Patel, Chair**, Ingredients and Extract Committee, Health Foods and Dietary Supplements Association (HADSA); **Mr. Umesh Kamble**, Secretary General Chamber For Advancement of Small and Medium Businesses (CASMB); **Mr. Sagar Kurade**, MD, Suman Project Consultants Pvt. Ltd; **Mr Yogesh Mudras**, Managing Director, Informa Markets in India **and Mr Rahul Deshpande**, Senior Group Director, Informa Markets in India.

Comprehensive Industry Showcases

Fi India 2025 presented a deep cross-section of the ingredients value chain - flavors & colors; spices & herbs; essential oils; natural ingredients; sweeteners; protein-based ingredients & extracts—with leading companies including Brenntag Ingredients India Pvt. Ltd., K.P. Manish Global Ingredients Pvt. Ltd., Synthite Industries Pvt. Ltd., Kerry Ingredients India Pvt. Ltd., Symega Food Ingredients Ltd., IMCD India Pvt. Ltd., Biospringer by Lesaffre, Plant Lipids (P) Ltd., Azelis (India) Pvt. Ltd., Biomed Ingredients (P) Limited, Rettenmaier India Pvt. Ltd. (JRS), Sudeep Nutrition, and Novozymes South Asia Pvt. Ltd. Top international exhibiting countries included the USA, Italy, Denmark, Poland, France, Brazil, Republic of Korea, Vietnam, Japan, and the UAE.

ProPak India 2025 was the India edition of the globally recognized ProPak exhibition series spanning Asia, Africa, and the Middle East—bringing international processing and packaging innovations to the Indian market while fostering global connections. Prominent exhibitors included Clearpack Automation Pvt. Ltd., Glatt Systems Pvt. Ltd., Goma Engineering Pvt. Ltd., Harikrushna

Machines Pvt. Ltd., Konica Minolta Business Solutions India Pvt. Ltd., Prompt Equipments Private Limited, SACMI Imola SC, Starpac India Ltd , Wraptech Machines Pvt. Ltd. and more. The show featured 80+ exhibitors showcasing sustainable machinery, smart packaging solutions, and advanced processing technologies serving food & beverage, pharmaceuticals, cosmetics, and household goods.

Strong Industry Support & New Engagement Zones

The events were supported by AFSTI (Association of Food Scientists & Technologists India), Delhi Chapter, CASMB, AIFPA (All India Food Processors' Association), HADSA (Health Foods and Dietary Supplements Association), IBA (Indian Beverage Association), SIB (Society of Indian Bakers), and ASPA (Authentication Solution Providers' Association). At ProPak India, attendees explored the MSME Pavilion, leverage business matchmaking, experienced live demonstrations and product launches, and engaged with decision-makers from India and overseas.

Feature-Rich Experiences & Knowledge Platforms

Fi India featured a diverse line-up of sessions covering critical themes across product development, nutrition, and innovation in the food and beverage sector. Day 1 witnessed discussions on the 'Basics of product design and development', 'Selection of food ingredients', 'Regulatory aspects of additives', and 'Sensory analysis for new product development'. Expert-led sessions by BENEO and others focused on plant-based, prebiotic, and protein-enriched solutions, alongside insights into the utilization of insoluble dietary fibers for nutritional and functional attributes. Marketing strategies for innovative ingredients and products were explored, complemented by panel discussions hosted by HADSA on "Ingredients – the Backbone of Product Development and Efficacy" and on Novel food ingredients and their applications".

Day 2 spotlighted the bakery sector with discussions on the 'Versatility of palm oil', 'The structural and nutritional advantages of oil palm in meeting trans-fat regulations', 'Health trends in baking, innovative ingredients', and 'The role of fortification in creating nutritious products'. Experts also highlighted 'Strategies for setting up future-ready industrial bakeries and shared insights on healthy bread innovations'. Day 3 brought a sharper focus on entrepreneurship and investment, featuring a fireside chat with investors moderated by Mr. Prashant Naigaonkar, Partner, RampUp Advisory LLP, followed by Fund Quest organised by CASMB and RampUp Advisory LLP, connecting innovators with potential investors. The event featured a host of rich experiences and knowledge platforms that fostered learning, networking, and innovation within the food and beverage industry. Alongside these sessions, the event offered engaging experiences and knowledge-driven platforms such as the Global Trend Zone with Mintel, unveiling emerging consumer and regulatory insights, and the Innovative Product Showcase featuring breakthrough launches. Live culinary demonstrations, a comprehensive conference with 25+ expert speakers, and the Fi India Awards celebrating innovation and excellence further enriched learning, networking, and collaboration across the F&B ingredients ecosystem.

Industry Growth & Market Insights

India's food processing industry today stands as one of the largest globally, accounting for 32% of the nation's total food market. It contributes nearly 14% of manufacturing GDP, 13% of exports, and 6% of total industrial investments, highlighting its pivotal role in the economy. According to a Deloitte–FICCI report, the sector contributes 7.7% to India's overall manufacturing output while supporting more than 7 million jobs directly and indirectly. Beyond its economic weight, the industry is instrumental in driving rural industrialisation, reducing post-harvest losses, and positioning India as a key hub for processed and value-added food products on the global stage.

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UNWRAPPING UPCOMING

EXHIBITIONS LINEUP

2025-26

S.R NO.	EVENT NAME	DATES	VENUE
1.	drinktec india	13-15 November 2025	Bombay Exhibition Centre (BEC), Mumbai
2.	PACK MACH ASIA EXPO	13-15 November 2025	Bombay Exhibition Centre (BEC), Mumbai
3.	2nd edition IntraPac India Packaging and Processing	10-13 December 2025	India Expo Centre, Greater Noida, Delhi-NCR
4.	World Mithai Makers	19-21 December 2025	Yashobhoomi, Dwarka Delhi
5.	INDUS:FOOD MANUFACTURING	6-8 January 2026	Yahobhoomi, IICE, New Delhi
6.	INDUS:FOOD	8-10 January 2026	India Exposition Mart, Greater Noida
7.	FOOD & DRINK PROCESSING EXPO	20-22 January 2026	Tripura Vasini - Palace Ground Bengaluru
8.	BAKERS	20-22 January 2026	Tripura Vasini - Palace Ground Bengaluru
9.	INDIA DAIRY PROCESSING EXPO 2023	20-22 January 2026	Tripura Vasini - Palace Ground Bengaluru
10.	INDIA FOOD PACK EXPO	20-22 January 2026	Tripura Vasini - Palace Ground Bengaluru
11.	AAHAR	4-8 March 2026	Bharat Mandapam, New Delhi
12.	ANUGA FOOD TEC INDIA	22-24 April 2026	Bharat Mandapam, New Delhi
13.	Fi	26-28 August 2026	Bombay Exhibition Centre
14.	anuga	29 Sept 01 Oct 2026	Bombay Exhibition Centre
15.	ANUGA FOOD TEC INDIA	29 Sept 01 Oct 2026	Bombay Exhibition Centre

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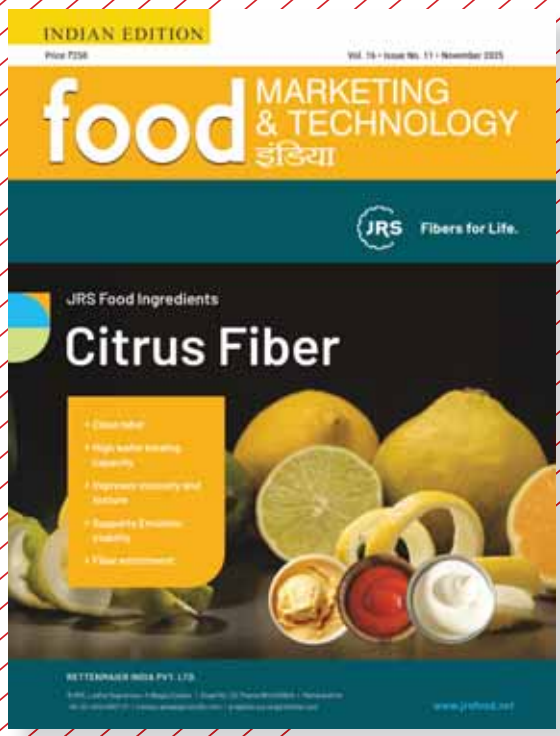

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