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Dear Readers,

We're excited to bring you the Oct - 2026 edition of our magazine.

Innovation is changing the food industry at every stage, from the way raw materials are processed to how products are packaged, stored, transported, and delivered to consumers. At the same time, manufacturers are balancing the demands of food safety, operational efficiency, sustainability, and evolving consumer expectations. In this October 2026 edition of Food & Beverage Processing Magazine, we explore some of the key developments across the food value chain and bring you closer to the ideas and technologies driving the industry's next phase of growth.

In our Processing Technology segment, we explore how advanced inspection technologies are strengthening food safety and quality assurance. Our feature on Next-Generation X-Ray Inspection in the Food Industry looks at the latest developments helping manufacturers detect contaminants and improve product quality. We also examine India's enormous opportunity in food processing through From Farm to Fortune: Unlocking India's Food Processing Potential, highlighting the importance of value addition, technology, infrastructure, and innovation in strengthening the country's food processing ecosystem.

The Packaging Technology section focuses on technologies that are changing the way food products are protected, preserved, and presented. Smart Packaging, Smarter Shelf Life explores innovations in freshness monitoring and intelligent packaging designed to provide better information about product condition and shelf life. We also look at the growing adoption of automation through Packaging Robots Market, examining how robotic systems are driving the next phase of packaging efficiency, flexibility, and productivity.



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Our Ingredients segment highlights the important role of functional ingredients in product development. In Food Enzymes in Bakery: Driving Quality, Efficiency and Innovation, we examine how enzymes are helping bakers improve dough handling, texture, volume, freshness, and process efficiency while supporting consistent product quality.

In our Warehousing & Supply Chain segment, we turn our attention to the growing importance of transparency and traceability across the food supply chain. Farm to Fork: Building Consumer Trust Through Food Traceability explores how tracking products from their origin to the consumer can strengthen food safety, improve supply chain visibility, support faster response to quality issues, and build greater confidence among consumers. As food supply chains become more complex, traceability is emerging as an essential part of responsible and resilient food businesses.

Alongside these features, this edition also includes updates from our corporate happenings and sustainability segments, offering insights into industry developments, business strategies, and environmental initiatives across the food ecosystem.

We also invite you to explore more insightful articles by visiting our website at www.foodnbeveragesprocessing.com

We encourage you to continue sharing your valuable feedback with us at info@dvrpublication.com.

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Tata 1mg expands its Protein range with a plant-based protein built on transparency



Tata 1mg has expanded its nutrition portfolio with the launch of Plant Based Protein, marking its entry into the plant protein category. The protein is designed to mix well without having that chalky flavour in it which usually discourages people from using it. It gives 24g of protein and 5g of BCAA per serving and is subjected to testing in NABL-approved third-party laboratories.

It is an extension of the existing protein powder portfolio. In India, apart from vegans, plant protein is being bought by health-conscious and lactose-intolerant people who do not consume dairy or have digestive issues after taking whey. This product is targeted at vegans, lactose-intolerant and health-conscious people equally. Given such a target market, there are two things that have always been considered a trade-off in such products. These have been either gritty or chalky textures which can be difficult to consume on a regular basis and whether the product formulation provides a complete amino profile. According to the company, both the factors have been considered challenges as compared to trade-offs.

When it comes to the balance of amino acids, the formula has relied on the combination of three proteins which consist of fermented yeast protein, pea protein and brown rice protein, which provides the full range of amino acids including all nine essential amino acids. The sources of plant-based protein have the deficiency of some essential amino acids, which our body is unable to produce on its own, therefore, the tri-protein blend has been developed.

There are only a few ingredients in the list. The protein has natural sweeteners. As compared to other brands of plant protein, Tata 1mg tests every batch of the product, rather than testing only at launch or at periodic intervals. Each lab report for every batch is available for consumers to view on their website, so they can see the testing for themselves. They say that "Every Batch Tested" is their most important trust marker for the brand along with their legacy in the healthcare sector.

"Plant-based protein should never mean second best," said Gaurav Agarwal, Co-Founder, Tata 1mg. "Most people who switch from plant protein to other things are doing so due to the dissatisfaction of the taste of the product. Our goal was to develop a plant-based protein product that not only tasted great but was also nutritious and could be tested as per quality standards. As a healthcare company, quality has always been central to how we develop our products, which is why testing every batch was an essential part of the process."

Tata 1mg's Plant Based Protein is available in flavours such as Hazelnut Chocolate, Cold Coffee and an unflavoured variant which you can purchase at Tata 1mg and other e-commerce websites such as Amazon & Flipkart.



Available in Magic Masala and Pudina, Avvatar Popped Chips are non-fried and offer 10gms of protein per 30gms pack, priced at INR 60/-, with no added sugar, no palm oil and no preservatives. The products are available on Avvatar website, Quick Commerce, Vending Machines and General Trade and Modern Trade. The new offering brings Avvatar's protein proposition into a familiar snacking format, extending the brand beyond traditional active nutrition.

Ms. Akshali Shah, Executive Director, Parag Milk Foods Ltd., said "This launch marks an important step in Parag Milk Foods' evolution from a dairy-led company to a broader nutrition-led food business. We see a significant opportunity to take our expertise in dairy and protein and build it into categories that are increasingly relevant to the way consumers eat today. With Avvatar, we are extending protein beyond traditional nutrition formats and into everyday consumption occasions, including snacking. Our ambition is to build a holistic protein ecosystem that brings together nutrition, convenience and accessibility across formats and lifestyles. Entering snacking is therefore not simply an extension of our portfolio; it is a strategic step towards creating a larger, more contemporary food and nutrition business with protein at its core."

Parag Milk Foods Takes its Nutrition Play into Snacking with Avvatar Popped Protein Chips

Parag Milk Foods Ltd. is expanding its nutrition portfolio into the fast-growing snacking category with the launch of Avvatar Popped Chips, marking the next phase of the company's journey from dairy to nutrition and now into new-age food categories. The launch strengthens Parag's ambition to make protein more accessible across formats, occasions and consumer needs.

The launch builds on Avvatar's growing portfolio of protein powders, ready-to-drink beverages and bars, with snacking emerging as the latest avenue to expand protein consumption. Together, these formats enable Avvatar to address a wider range of nutrition needs and consumption occasions, making protein a more relevant part of everyday food choices.

The launch further strengthens Parag Milk Foods' New Age Business, with Avvatar playing a key role in the company's strategy to build new growth avenues in nutrition and adjacent food categories. By leveraging its expertise in dairy and protein, Parag is expanding its presence into high-growth segments that align with evolving consumer preferences.

With nutrition at the heart of its next phase of growth, Parag Milk Foods is building on its dairy heritage to create a broader portfolio where protein can play a role across the consumer's day from specialised nutrition to convenient, everyday snacking.

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Happy Cultures Launches Dubai Kunafa-Flavoured Yeast Protein



Indian health and wellness brand Happy Cultures has expanded its protein portfolio with the launch of Dubai Kunafa Yeast Protein, combining a trending indulgent flavour profile with a complete plant-based protein source. Priced at an MRP of ₹2,199, the new offering features 100% yeast protein isolate along with real pistachios, bringing a distinctive twist to everyday protein consumption.

Each serving provides 24g of complete yeast protein and carries a PDCAAS score of 1, indicating a high-quality protein with a complete amino acid profile. The formulation contains no added sugar or artificial sweeteners and is naturally sweetened with monk fruit. It is also free from lactose, dairy, gluten and soy. The addition of probiotics further strengthens the product's positioning as a convenient protein option for consumers increasingly seeking nutrition alongside digestive wellness.

The launch comes at a time when protein consumption in India is expanding beyond conventional sports nutrition and fitness-focused consumers. Consumers are increasingly looking for products that combine nutritional benefits with taste, convenience and variety. According to IMARC Group, India's protein supplement market is projected to reach ₹13,186 crore (US\$1.52 billion) by 2033, reflecting the growing opportunity for innovation within the category. Quality and product safety have also been highlighted as important aspects of the new offering. Happy Cultures states that the product has undergone independent testing by Eurofins Analytical Services India, with batches evaluated for parameters including nutritional composition, amino acid profile, melamine and heavy metal contaminants.

Commenting on the launch, Amit Monteiro,

CEO, Happy Cultures, said that innovation in the protein category needs to go beyond conventional flavours and create a more engaging consumer experience. According to the company, Dubai Kunafa was selected because of its growing familiarity and popularity among consumers, making it an opportunity to introduce a more indulgent flavour into the yeast protein segment.

Monteiro added that the company aims to change how consumers perceive yeast protein by exploring flavours beyond traditional vanilla, chocolate and coffee. The company believes culturally relevant and familiar flavours can help make protein products more appealing to a broader consumer base.

Real pistachios are another key feature of the product. Rather than depending exclusively on flavouring, Happy Cultures has incorporated pistachios to create a more authentic Dubai Kunafa-inspired experience. The product is positioned within the company's premium

protein portfolio, where flavour development is increasingly becoming an important element of product innovation.

The launch also highlights how social media-driven food trends are influencing product development across categories. Dubai chocolate and Kunafa-inspired products have generated considerable consumer interest, encouraging brands to adapt these emerging flavour trends into new formats, including nutrition and wellness products.

For Happy Cultures, the launch forms part of its wider strategy to develop yeast-based protein products that combine nutrition, taste and ingredient functionality. The company is looking to broaden the appeal of protein consumption by moving beyond conventional flavour profiles and creating products that offer consumers a more varied and enjoyable experience.

Dubai Kunafa Yeast Protein is available through the Happy Cultures website as well as online platforms including Swiggy, Zepto, BigBasket, Amazon and Flipkart. The product joins the company's broader portfolio of proteins, nutritional supplements and Gut First Solutions.

David Protein Launches Ready-to-Drink Protein Milkshakes



David Protein announced the launch of its first ready-to-drink Protein Milkshakes, bringing the brand's protein-forward approach to a convenient new format. David Protein Milkshakes are made with ultrafiltered milk and deliver 30g of protein, 140–150 calories, and less than 1g of sugar per 12 oz bottle. Smooth, thick, and creamy from the first sip to the last, the new shakes are designed to deliver the taste and experience of a milkshake with the protein density consumers expect from David.

Available in two flavors:

- Vanilla: Smooth, creamy, and classic, with 30g of protein, 140 calories, and less than 1g of sugar per 12 oz bottle.

- Chocolate: Rich, creamy, and co-coa-forward, with 30g of protein, 150 calories, and less than 1g of sugar per 12 oz bottle.

The launch is supported by "Drink David," a new campaign featuring supermodel Stella Maxwell. The campaign introduces David's distinctive gold Milkshake bottles through a series of images starring Maxwell and extends the brand's presence across fashion, beauty, and culture. Drink David will appear across digital, social, and out-of-home placements in New York City this month.

David Protein Milkshakes launch September 8 at davidprotein.com and at select New York City stores.

The launch marks David's latest expansion beyond protein bars. In June, the company introduced David Frozen Dessert, which delivers 30g of protein per pint with 210–260 calories and 1–2g of sugar, depending on the flavor. David Gold bars deliver 28g of protein for 150 calories, while David Bronze bars deliver 20g of protein for 150 calories.

SOURCE: Medici Brands, Inc.

Emami Agrotech Launches WeMe, a Digital-First Snacking Brand



Emami Agrotech Limited (EAL), the branded foods business of the ₹30,000-crore Emami Group, has entered India's growing packaged snacking market with the launch of WeMe, a digital-first brand targeting evolving consumer lifestyles and snacking habits. The launch expands EAL's foods business beyond edible oils and pantry staples under its Emami Healthy & Tasty portfolio, creating a dedicated platform focused on innovation-led snacking.

WeMe launches with three categories: Choco Hazelnut Spread, including a portable chip-let-format offering that the company describes as India's first; Jhuri Aloo Bhaja, bringing an Eastern Indian favourite into the organised packaged foods segment; and Potato Chips in flavours designed around changing consumer preferences. Built around the philosophy "Togetherness Always Tastes Better," the brand is targeting Gen Z and Millennials, who are increasingly seeking convenience, indulgence, quality and authenticity across everyday snacking occasions.

Emami Agrotech plans to invest nearly ₹750 crore in WeMe and aims to build it into a ₹1,000-crore brand within five to seven years. The initiative is expected to create more than 1,000 direct and nearly 3,000 indirect employment opportunities. The brand will initially be available through quick-commerce platforms in Kolkata, Delhi NCR, Mumbai, Bengaluru and Ahmedabad, with general trade expansion beginning in Kolkata before entering other markets.

As a digital-first brand, WeMe will use creator-led content, social media and quick commerce to connect with younger consumers and respond to emerging trends. Emami Group directors Aditya Vardhan Agarwal, Manish Goenka and Vidula Agarwal highlighted the brand's role as a long-term growth platform for the company's foods business, supported by investments in product innovation, brand building, digital capabilities and distribution.

Z Natural Foods Launches Chocolate-Flavoured Goat Whey Protein Concentrate



Z Natural Foods, a family-owned manufacturer of organic foods and powdered superfoods, has expanded its functional nutrition portfolio with the launch of Chocolate Goat Whey Protein Concentrate. The formulation combines goat whey protein, organic dark chocolate made with real cacao, and medium-chain triglycerides (MCTs), offering a convenient protein supplement focused on nutrition, taste and digestibility.

The product uses A2 beta-casein goat whey protein, which the company positions as an easier-to-digest alternative to conventional whey proteins containing A1 beta-casein. Organic cacao replaces artificial chocolate flavouring, providing naturally occurring bio-active compounds along with a rich chocolate taste. MCTs are included as a rapidly metabolised source of energy for the brain and muscles. Developed around Z Natural Foods'

"synergy" philosophy, the product combines three functional ingredients in a single formula to simplify daily nutrition while supporting energy and overall wellness. Jonathan Parker, Director of Nutrition Sciences at Z Natural Foods, said the launch reflects the company's focus on developing convenient, high-quality nutritional products that combine functional benefits with an enjoyable taste experience.

The Chocolate Goat Whey Protein Concentrate is available in 1 lb, 5 lb and 55 lb pouches, targeting health-conscious consumers seeking clean-label and functional nutrition solutions. The launch further expands Z Natural Foods' presence in the premium protein supplement and functional food ingredients market.



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India Gets Its First Clean-Label Sparkling Water Brand: SIX6R



SIX6R, a new clean-label sparkling water brand, has launched in India at ₹79 per can, with three variants: Classic, Lemon and Peach. Made with carbonated water and fruit flavour, the products contain no added sugar, sweeteners or preservatives. The brand is targeting consumers seeking simpler beverage options while maintaining flavour and convenience.

SIX6R made its pre-launch debut at St. Xavier's Malhar Festival and has since built a social community of more than 20,000 consumers. The brand said its proposition is designed to address growing consumer scrutiny of beverage ingredients and the limited options available to those looking to reduce sugar

intake. Co-founder Karan Nohria said the brand was developed to offer a drink without added sugar, sweeteners or preservatives, while co-founder Rashi Oberoi highlighted its focus on youth culture, distinctive packaging and an Indian identity.

SIX6R is available directly through its website with delivery across India and at Nature's Basket and Society stores in Mumbai from September 1, 2026. The company said the ₹79 price point is intended to position the product as an accessible premium sparkling water option, while its clean-label formulation and bold branding aim to establish a new consumption occasion in India's beverage market.

Adie Broswon Group Launches Kingpin Whisky, Expands Presence in India's Growing Whisky Market

The Adie Broswon Group has expanded its spirits portfolio with the launch of Kingpin Whisky, a new whisky created for a new generation of consumers seeking a combination of bold character, contemporary positioning and accessible pricing. Kingpin is being introduced across Delhi, Punjab and Chandigarh, strengthening the Group's presence in the North Indian alcoholic beverages market and marking another step in its focus on building consumer-facing brands within the spirits category.

Built around the philosophy "Live Bold. Drink Bold.", Kingpin has been created for consumers who associate their choices with confidence, ambition and individuality. The brand seeks to occupy the space between aspiration and everyday accessibility, offering a distinctive identity backed by a strong liquid proposition. Kingpin is crafted from a carefully developed blend of choicest malts and Indian grain spirits, bringing together the depth and character of malt whisky with the smoothness and versatility of grain spirit. The whisky



undergoes a meticulous maturation and filtration process designed to create a bold yet balanced drinking experience.

The liquid has a rich and layered profile, led by pronounced smoky notes complemented by subtle hints of tobacco and honey, followed by a smooth and lingering finish. The profile has been developed for consumers looking for a whisky with discernible character while remaining approachable across different drinking occasions.

Kingpin enters the market at a time when India continues to stand out within the global alcoholic beverages landscape. According to IWSR's latest data, India recorded 4% beverage alcohol volume growth in 2025, while Indian whisky volumes also grew 4% during the year. Kingpin's proposition has been developed around this evolving consumer landscape, combining a distinctive whisky profile and contemporary brand identity with accessible pricing. Its visual identity features a distinctive royal blue and gold design, with the crown-inspired Kingpin insignia creating a strong shelf presence and reinforcing the brand's confident personality. With Kingpin, The Adie Broswon Group is looking to build a differentiated proposition within the competitive IMFL whisky segment, bringing together product character, contemporary branding and wider consumer accessibility. The launch also forms part of the Group's broader strategy of developing and scaling its own alcoholic beverage brands alongside its established brewing and distillation operations.

Kingpin is being introduced across a broad portfolio of pack sizes comprising 1,000 ml, 750 ml, 500 ml, 375 ml, 180 ml, 90 ml and 60 ml, enabling the brand to cater to different markets, consumption occasions and price points. The 750 ml bottle is priced at ₹500 in Delhi, ₹530 in Chandigarh and ₹750 in Punjab.

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Mondelēz International launches Toblerone Diamond Truffles with Biscoff®

Mondelēz International has announced the global launch of Toblerone Diamond Truffles with Biscoff®, a collaboration with Lotus Bakeries that combines Toblerone milk chocolate with Biscoff® spread and crunchy honey-almond nougat pieces. The diamond-shaped truffles are individually crafted and filled with Biscoff® spread, bringing together the caramelised taste and texture of Biscoff® with Toblerone's chocolate and nougat profile. The launch expands Toblerone's premium chocolate portfolio as demand for elevated flavour combinations continues to grow.

The new product builds on Toblerone's introduction of diamond-shaped truffles in 2024, which the company said marked an expansion beyond its iconic triangular chocolate bar. According to Mondelēz, the truffles have performed strongly in the premium boxed

chocolate category, prompting the brand to extend the format through the Biscoff® collaboration. Isabelle Maes, Chief Marketing Officer, Lotus Bakeries, said the partnership brings the distinctive Biscoff® biscuit and spread experience into a new chocolate format.

The launch also marks the first time Mondelēz International has partnered with Costco to introduce a product range globally. Toblerone Diamond Truffles with Biscoff® are being offered in two formats. The 495g premium box is exclusive to Costco in the US, Canada, Australia, UK, Spain, France, Sweden, Iceland and New Zealand, as well as Taiwan. The 180g sharing box is available in the UK, Ireland, Switzerland and Australia, with additional markets expected to follow. Products are currently rolling out at selected Costco stores.



Horlicks Expands into Everyday Protein Nutrition with the launch of Horlicks Protein Powder



Horlicks has expanded its nutrition portfolio with the launch of Horlicks Protein Powder, targeting growing consumer demand for convenient, everyday protein intake beyond fitness-focused use cases. As awareness of protein consumption grows across India, consumers are increasingly seeking nutrition products they can easily incorporate into their daily routines. Responding to this trend, Horlicks has introduced a new protein powder designed for on-the-go consumption, work schedules, travel, and busy lifestyles. The newly launched product delivers 24 g of protein and 4 g of prebiotic fibre per serving and is available in single-serve sachets aimed at improving convenience and portability.

Rajneet Kohli, Executive Director, Foods, Hindustan Unilever Limited said, "Horlicks has a legacy of over 100 years, built on strong science and nutrition credentials. As we continue to evolve with the changing needs of consumers, protein is a natural extension for the brand. We see an opportunity to make it more relevant and accessible for everyday lifestyles. When we spoke to consumers, one insight that really stood out was that 'life is a gym', whether it is rushing through a busy workday, navigating a long commute, carrying groceries or simply keeping up with everything the day demands. This insight led to our larger thought, 'Your Day Is the Real Workout.' With Horlicks Protein Powder, our ambition is to make quality protein easier to incorporate into the everyday lifestyles of millions of Indians."

According to the company, the formulation is based on fermented yeast protein, a complete protein source that contains all nine essential amino acids required by the body. The product also has a PDCAAS (Protein Digestibility-Corrected Amino Acid Score) of 1.0, a globally recognised benchmark used to assess protein quality and digestibility.

The formulation includes inulin, a prebiotic fibre, and papain, a plant-derived digestive enzyme. Fermented yeast protein is also naturally lactose-free, catering to consumers

looking for alternative protein sources.

Sujatha Jayaraman, Vice President and Head, Foods R&D and Regulatory Affairs, Hindustan Unilever Limited said, "As consumers become more aware of protein, the conversation also needs to move from simply how much protein a product contains to the quality and completeness of that protein. That thinking shaped the science behind Horlicks Protein Powder. Fermented yeast protein provides all nine essential amino acids, while the finished product has a PDCAAS score of 1.0, a recognised measure of protein quality and digestibility. We have complemented this with inulin, a prebiotic fibre, and papain, a plant-derived proteolytic enzyme that aids protein digestion. The result is a science-led formulation that brings together high-quality complete protein with ingredients selected to support protein digestion and gut-friendly nutrition in one product."

The launch reflects a broader shift in the health and wellness, functional nutrition, protein supplements, and packaged nutrition segments, where brands are increasingly positioning protein as part of everyday nutrition rather than only sports and fitness-focused consumption.

Horlicks Protein Powder is available in Chocolate, Coffee, and Unflavored variants. Each 1 kg pack contains 28 single-serve sachets, eliminating the need for measuring scoops and making consumption more convenient throughout the day. The product is now available across retail stores and select e-commerce platforms in India.

Eggos Introduces Traceable Free-Range Eggs Under Farm and Fable Brand



Eggos has launched its new Farm and Fable by Eggos Free Range Eggs in India, combining free-range production with farm-level traceability. The launch comes as consumer interest grows in transparent food sourcing, animal welfare, food safety, and clean-label nutrition, particularly among urban households seeking greater visibility into how food is produced.

The company said each pack features a unique batch code that consumers can enter on its website through the "Know Your Eggs" section. The verification platform provides batch-level information including the source farm, farmer details, farming practices, feed information, technology-enabled production processes, and external laboratory test reports.

According to Eggos, the initiative is designed to provide consumers with verifiable information about the origin and production of the eggs rather than relying solely on product-level claims. The company said the offering responds to growing demand for premium eggs, free-range products, traceable food, animal welfare, and greater supply chain transparency. The product has initially been launched in Bengaluru, Mumbai, and Pune, with plans to expand into Delhi NCR, Hyderabad, and other Tier-I cities through leading quick commerce platforms. Eggos said the eggs undergo automated grading, UV sanitisation, weight screening, and processes

designed to minimise human handling, supporting consistency and hygiene across batches.

Abhishek Negi, Co-Founder and CEO, Eggos, said, "At Eggos, we have always believed that how an egg is produced matters just as much as the egg itself. With Farm and Fable by Eggos Free Range Eggs, we are bringing consumers eggs from hens raised the way nature intended, but more importantly, we are giving them the ability to trace it, verify it, and trust it. As Indian households become more mindful about the origins and quality of their food, we see strong and growing demand for transparency they can actually check for themselves."

The launch reflects a wider shift in India's food and FMCG market, where consumers are increasingly seeking information about sourcing, production practices, food safety, and nutritional attributes. For Eggos, the Farm and Fable offering places traceability and production transparency alongside the product as part of its approach to premium egg retailing. As demand for free-range eggs and premium protein products develops across urban India, the company is positioning traceable sourcing and accessible production information as key elements of its offering. The move also highlights the growing role of supply chain visibility in fresh food, protein nutrition, FMCG, and modern food retail.

Mission Foods Introduces Protein and Grain-Free Tortilla Style Chips in Four Varieties

Mission Foods, maker of the Mission® brand of tortillas and wraps, has expanded its Better for You range with four new tortilla-style chip varieties focused on protein, fiber and grain-free ingredients. The new lineup includes Mission® Protein Tortilla Style Chips in Chile Limón and Jalapeño flavours, along with Mission® Grain Free Tortilla Style Chips in Sea Salt and Hint of Lime flavours. The Mission® Protein Tortilla Style Chips provide 10 grams of plant-based protein per serving and are described as a good source of protein. The chips are also gluten-free and vegan, offering consumers a protein-focused snack option while retaining the bold flavour and crunch associated with tortilla-style chips.

The Mission® Grain Free Tortilla Style Chips are made with 100% cassava flour, whole chia seeds and avocado oil. Available in Sea Salt and Hint of Lime varieties, the chips are a good source of fiber and are made with non-GMO ingredients. Mission Foods said the products are designed for dipping, sharing or eating directly from the bag, while catering to consumers seeking simpler ingredient profiles and grain-free snack options.

"Our Better for You line has always been about giving people trend-setting options that fit their lifestyle and taste great," said Sathish Mohanraju, VP of Sales and Marketing for Mission Foods. "Whether folks are looking for simpler ingredients or a new favorite everyday snack – these new chips are for them."

Mohanraju added that consumer interest in protein and fiber has influenced the development of the new products. "We're always listening to our customers. Protein and fiber are two things people are trying to get more of, and snacks are a great place to do it. Our Protein chips offer 10 grams of plant-based protein per serving, and our Grain Free chips are a good source of fiber, so people can enjoy a snack that works for them," he said. Mission® Protein Tortilla Style Chips and Mission® Grain Free Tortilla Style Chips are now available nationwide at Kroger and its affiliates, with additional retailers expected to roll out the products through the fall. The new varieties are available in the snack aisle.



Next-Generation X-Ray Inspection in the Food Industry: Advancing Food Safety and Quality Control

Payoshni S. Joshi



1. Introduction

In today's high-speed food manufacturing environment, ensuring product safety goes beyond detecting visible defects. The increasing automation of processing and packaging operations has created a need for reliable inspection technologies capable of operating continuously while maintaining product quality and safety. Foreign materials such as metal, glass, stones, bones and other fragments can enter food through raw materials, harvesting, processing equipment and packaging operations, creating potential physical hazards for consumers. While visual inspection remains an important quality-control practice, concealed or internal contaminants may not be readily detected through visual methods alone. X-ray inspection provides a non-destructive method for examining products internally and can detect a broader range of dense foreign materials, including certain non-metallic contaminants. The technology is now evolving beyond basic contaminant detection toward automated, data-driven inspection and intelligent quality-control systems.

2. What Is X-Ray Inspection?

X-ray inspection is a non-destructive technology used to examine food products and their packaging for foreign materials and other abnormalities without opening or damaging the product. The system

generates X-rays that pass through the packaged food. As X-rays travel through the product, different materials absorb different amounts of radiation depending primarily on their density, thickness and composition. A detector positioned on the opposite side of the product captures the X-ray signal and converts it into an electronic image. Image-processing software then analyses variations in the image to identify areas that differ from the expected product profile. Depending on the system and application, the inspection can identify foreign materials as well as certain product or packaging abnormalities. When a product falls outside the defined inspection criteria, an automatic rejection mechanism removes it from the production line, allowing inspection to be integrated into high-speed manufacturing operations.

Basic inspection sequence:

X-ray source → Food/product → Detector → Image processing → Analysis → Automatic rejection

3. What Can X-Ray Inspection Detect?

One of the major advantages of X-ray inspection is its ability to identify foreign materials that may remain hidden inside a food product or package. Conventional X-ray systems are particularly effective when the contaminant has sufficient density or X-ray absorption contrast relative to the

surrounding food. Commonly detectable foreign bodies include metal fragments, glass, stones and other mineral matter, calcified bone, and certain dense plastics and rubber materials. The actual detection capability depends on factors such as contaminant size, density, product composition, package format and inspection conditions. Low-density or organic materials can be more difficult to detect using conventional X-ray absorption imaging.

Beyond foreign-body detection, modern X-ray systems can also support product and process quality control. Image analysis can be used to identify missing or broken components, incorrect fill levels, product deformation, damaged products, packaging abnormalities and incorrect product counts, depending on the system configuration and application. Thus, X-ray inspection can serve not only as a food-safety control but also as a tool for quality assurance and process control, helping manufacturers identify deviations before products leave the production line.

4. X-Ray Inspection vs Metal Detection

X-ray inspection and metal detection are both established technologies for controlling physical hazards in food processing, but they operate on different principles and have different detection capabilities. Metal detectors are specifically designed to identify metallic contaminants, whereas X-ray systems can detect metals as well as many dense non-metallic foreign bodies, including glass, stone and bone. Certain dense plastics may also be detectable under suitable conditions.

X-ray inspection can also provide product-integrity checks such as detecting missing or broken components, under- or over-fills and incorrect product counts, depending on system configuration.

Therefore, X-ray inspection should not simply be viewed as a replacement for metal detection. The two technologies are complementary, and the appropriate inspection strategy depends on the product characteristics, packaging format, potential hazards, inspection point and required food-safety controls. In some production environments, both technologies may be incorporated at different stages of the process.

5. Next-Generation X-Ray Technologies

The evolution of X-ray inspection is moving beyond conventional two-dimensional imaging toward systems that combine advanced sensing, intelligent image analysis and digital connectivity. These developments are expanding the role of X-ray inspection from foreign-body detection to broader, data-driven quality control.

5.1 Dual-Energy X-Ray Technology

Dual-energy X-ray systems acquire information at two different X-ray energy levels. Because materials interact differently with X-rays at different energies, combining these signals can provide additional information for distinguishing materials that may appear similar in a conventional X-ray image. This can improve discrimination in challenging inspection applications and support detection of certain lower-density foreign materials. Research has demonstrated the potential of dual-energy imaging for automated foreign-object detection in food products.

5.2 AI and Machine Learning

Artificial intelligence and machine learning are increasingly being incorporated into automated food inspection. Algorithms can analyse large numbers of X-ray images, recognise complex patterns and distinguish product characteristics from abnormal features. When appropriately trained and validated, these systems can support product-specific inspection criteria and help reduce unnecessary rejects. However, AI should be viewed as a tool for improving decision-making rather than a guarantee of zero false rejects. Recent food-industry research highlights AI's growing role in automated quality control, anomaly detection and real-time inspection.

5.3 Multi-View and Multi-Angle Inspection

Products with irregular shapes, overlapping components or difficult geometries can create areas that are harder to inspect from a single viewpoint. Multi-view or multi-angle imaging can provide additional perspectives of the product, improving inspection coverage and helping reduce blind spots. The suitability of this approach depends on the product and system configuration.

5.4 High-Speed Inspection

Modern X-ray inspection systems are designed for integration into automated production lines, where products can be inspected continuously at production speed. This enables inspection to occur without requiring every product to be manually opened or sampled, supporting high-

Parameter	X-Ray Inspection	Metal Detector
Metal detection	Yes (ferrous, non-ferrous, stainless steel)	Yes (ferrous, non-ferrous, stainless steel)
Glass	Detectable	Not detectable
Stones/mineral matter	Detectable	Not detectable
Dense/calcified bone	Detectable	Not detectable
Dense plastics	Detectable under suitable conditions	Not detectable
Product inspection	Can check fill levels, missing/broken items, product counts	Limited to metal detection
Packaging influence	Works through metallized film, foil, and many packaging formats	Performance reduced by metallic packaging (e.g., foil)
Cost	Higher investment, but adds quality assurance features	Lower cost, ideal for metal-only hazards

One of the major advantages of X-ray inspection is its ability to identify foreign materials that may remain hidden inside a food product or package. Conventional X-ray systems are particularly effective when the contaminant has sufficient density or X-ray absorption contrast relative to the surrounding food. Commonly detectable foreign bodies include metal fragments, glass, stones and other mineral matter, calcified bone, and certain dense plastics and rubber materials. The actual detection capability depends on factors such as contaminant size, density, product composition, package format and inspection conditions. Low-density or organic materials can be more difficult to detect using conventional X-ray absorption imaging.

throughput manufacturing and automated reject handling.

5.5 Smart Data Connectivity

The next stage of development is also digital. Inspection systems can generate records of inspection results, rejected products and process trends. When connected with plant-level quality or manufacturing systems, this information can support traceability, trend analysis, remote monitoring and faster investigation of recurring deviations. Such connectivity aligns X-ray inspection with the broader Industry 4.0 approach, in which sensors, automation, data analytics and interconnected production systems work together to support more responsive quality management. Recent reviews identify machine learning, IoT integration, data analytics and interconnected quality-control systems as important components of smart food manufacturing.

6. Applications Across the Food Industry

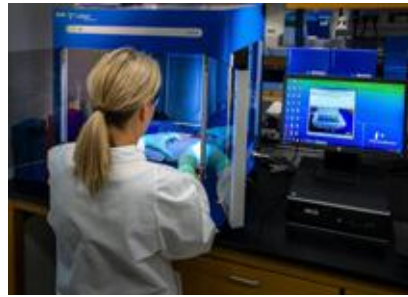
From frozen peas to ready-to-eat meals, X-ray inspection has become one of the most versatile tools in modern food processing.

Unlike traditional metal detectors, which are limited to spotting metallic contaminants, X-ray systems can identify a wide range of hazards—glass shards, stones, dense plastics, and even calcified bone fragments. But their role doesn't stop at safety. In processed foods like bakery items, meat products, snacks, and confectionery, X-ray machines also check for product integrity: ensuring the right fill levels, detecting broken or missing components, and verifying counts. This makes them invaluable for maintaining both safety and quality. In packaged foods, whether sealed in pouches, cans, jars, or cartons, X-ray inspection allows manufacturers to look inside without breaking the seal.

The FDA recognizes cabinet X-ray systems as safe industrial tools, specifically highlighting their use in food inspection. For frozen foods, the technology ensures that vegetables, snacks, and complete meals meet export standards. Automated inspection not only reduces the risk of rejected consignments but also strengthens traceability and customer confidence. Ultimately, X-ray inspection is not a replacement for metal detection it's a complementary technology. Together, they form a layered defense against contamination, supporting preventive controls and ensuring that food reaches consumers in its safest, most reliable form.

7. Factors Affecting X-Ray Detection Performance

X-ray inspection systems rely on density differences to identify foreign objects, but performance varies with product and process conditions. Product density and thickness can mask contaminants, while geometry and uniformity affect image clarity. Contaminant size and density determine detectability: larger, denser materials are easier to identify than small, low-density fragments. Packaging materials such as foil or multilayer films may attenuate signals, reducing sensitivity. Line



speed influences exposure time, requiring recalibration at higher throughput. X-ray energy and detector resolution must be optimized to balance penetration and image detail. Environmental factors like temperature and moisture alter product texture, impacting detection consistency. Finally, equipment calibration and validation are critical to ensure reliable performance across different applications. Importantly, detection capability is application-specific; no single threshold applies universally to all food products. Continuous optimization is essential for robust food-safety assurance.

8. Integration with HACCP and Food Safety Systems

X-ray inspection should never be treated as a standalone safeguard. Its role must be defined within a Hazard Analysis and Critical Control Point (HACCP) plan, where hazard analysis determines whether X-ray inspection is appropriate and at which stage it should be applied. In some cases, it may be designated as a Critical Control Point (CCP) or an Operational Prerequisite Program (OPRP), depending on the risk profile. Performance must be supported by preventive controls, with inspection results feeding into verification and validation activities to confirm system effectiveness. When contaminants are detected, corrective actions must be documented and implemented, ensuring affected product is removed from distribution. Equally important are traceability and record keeping, which provide documented evidence of compliance and strengthen consumer trust. Ultimately, X-ray inspection enhances food safety when embedded within a structured HACCP system, complementing other preventive and monitoring measures.

9. Challenges and Limitations

While X-ray inspection offers powerful capabilities, it is not without challenges. The initial investment is significantly higher than metal detection, and ongoing maintenance requirements add to operational costs. Effective use demands operator training and adherence to radiation-safety protocols, even though cabinet systems are designed to be safe. Performance is product-specific, requiring validation for each application to avoid false rejects or missed contaminants.

X-ray inspection should never be treated as a standalone safeguard. Its role must be defined within a Hazard Analysis and Critical Control Point (HACCP) plan, where hazard analysis determines whether X-ray inspection is appropriate and at which stage it should be applied. In some cases, it may be designated as a Critical Control Point (CCP) or an Operational Prerequisite Program (OPRP), depending on the risk profile.

Detection sensitivity varies with product density, geometry, and contaminant type, making routine performance verification essential. These limitations underscore that X-ray inspection is a tool within a broader food-safety framework, not a perfect solution. Looking ahead, advances in detector resolution, image processing, and AI-driven analytics promise to reduce false rejects, improve sensitivity, and make systems more accessible for diverse food manufacturers.

10. Future Outlook

The next generation of X-ray inspection will be shaped by AI, automation, and connectivity. Advances in intelligent image analysis promise improved detection of low-density contaminants, while smarter algorithms will help reduce false rejections. Integration with predictive maintenance tools will minimize downtime, and real-time production analytics will allow manufacturers to monitor performance continuously. With cloud-based data integration, inspection results can feed directly into digital traceability systems, supporting automated quality decisions and compliance reporting. As part of the move toward smart factories, X-ray inspection will become more connected, adaptive, and efficient. The future of food inspection is moving from simply detecting contamination toward continuously monitoring product safety, quality, and process performance.

Author's Bio

Payoshni S. Joshi is a technical writer specializing in the food and beverage industry. She regularly contributes authoritative articles to Food & Beverages Processing magazine, highlighting innovations, best practices, and emerging trends that are shaping the global food and beverage landscape.

Sources to the article are available upon reader request

Why Moisture Control Matters in Beverage and Food Processing



Humidity is present everywhere, and its level changes with location, season and time of day. Most people barely notice it in daily life, but in beverage and food manufacturing, uncontrolled moisture can quietly undo hours of careful work.

Many raw materials used in this sector — sugar, milk powder, malt, spices, flavouring agents and packaging materials — are hygroscopic, meaning they readily absorb moisture from the surrounding air. Once this happens, powders clump, ingredients lose flow, and products become harder to process on automated lines. Excess moisture also creates the conditions microorganisms need to grow, shortening shelf life and putting product safety at risk. Even packaging can be affected, with paperboard and film absorbing moisture and weakening before a product ever reaches the shelf.

This is where controlled dehumidification plays its part. By maintaining consistent temperature and relative humidity across production, filling and packaging areas, manufacturers can keep ingredients free-flowing, protect product consistency batch after batch, and extend shelf life without changing formulations. Controlled environments also reduce clumping and caking in storage silos and warehouses, cutting down on waste and rework.

As beverage and food companies scale up and diversify their product lines, managing humidity is no longer just a comfort factor for the plant — it is a quality and safety requirement built into the process itself. Getting the environment right, from raw material storage to final packaging, helps ensure that what reaches the consumer is exactly what left the production line.

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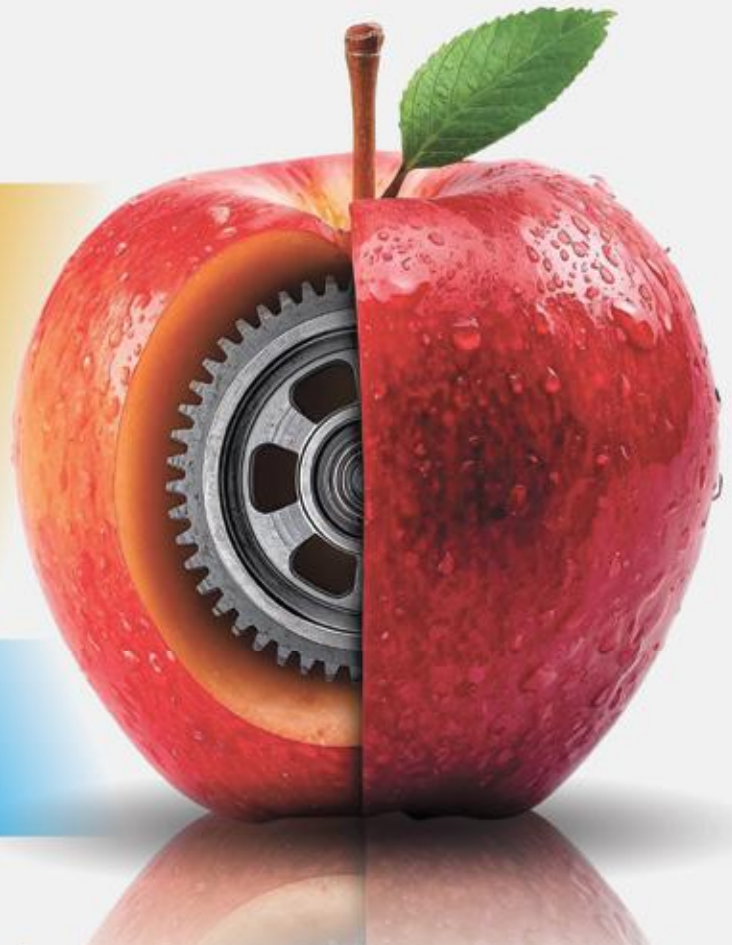
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From Farm to Fortune: Unlocking India's Food Processing Potential

Mohan L^{1,2}, Vasugi Murugan², Vishalini K², Maloth Venkateshwarlu², Amudha Surabhi³, and Akalya Shanmugam^{2*}

Abstract

India has emerged as one of the world's leading producers of agricultural and allied commodities, providing a strong foundation for developing a globally competitive food-processing sector. But agricultural production is not sufficient to maximize the economic returns unless supported by good value chain development, development of modern infrastructure and integration into the market chain. Food processing also increases shelf life, decreases post-harvest losses, enhances nutritional value, generates jobs, boosts exports and supports rural industrialisation. This article explores the strengths and challenges of food processing in India, technological advancements, and the government's initiatives. This article looks at the strengths and challenges of food processing in India, technological advancements, and opportunities in the global market. It highlights the need of having a science-based and innovation-oriented food processing ecosystem to transform agricultural surplus into sustainable prosperity and take India towards the vision of Viksit Bharat 2047.

Introduction

Agriculture has long been the backbone of India's economy, ensuring food security, supporting rural livelihoods and supplying raw materials to numerous industries. However, the real economic benefit of agriculture is not in the harvest, but in the effective processing of raw produce into safe, nutritious and marketable products. Food processing fills this gap by providing increased shelf life, decreased losses, improved product quality, convenience and linking farmers to domestic and international markets.

Countries with developed food-processing industries provide much higher economic returns from agricultural production through value addition, innovation, branding, and efficient supply chains globally. Food Processing is one of the most promising avenues for enhancing farmers' incomes, creating skilled jobs, encouraging entrepreneurship, and boosting export competitiveness in India, which has a highly diversified agriculture sector, ranging from cereals, pulses, oilseeds, fruits, vegetables, livestock, dairy, fisheries, etc. (Food and Agriculture Organization, 2024; Ministry of Food Processing Industries, 2025).

The sector has evolved far beyond conventional preservation techniques. The innovations of automation, digital technologies, intelligent packaging, cold-chain logistics and new processing technologies are transforming the food production, distribution and consumption landscape. At the same time, there is an emerging shift in consumer food preferences for healthy, convenient, functional and sustainable foods that offers new opportunities for innovation and market growth. The ecosystem has been further strengthened through various government schemes like the Pradhan Mantri Kisan SAMPADA Yojana, PM Formalisation of Micro Food Processing Enterprises Scheme and the Production Linked Incentive Scheme for Food Processing Industry, which have been supporting the development of infrastructure, growth of enterprises, technology adoption and investment.

The focus is not just on increasing food production anymore, as India strives to become Viksit Bharat 2047. The real opportunity is to add more economic, nutritional and social value to each harvest. The article examines how the strengths of Indian agriculture, technological advancements, policy support and evolving food markets can combine to build food processing as a strong engine of inclusive and sustainable prosperity.

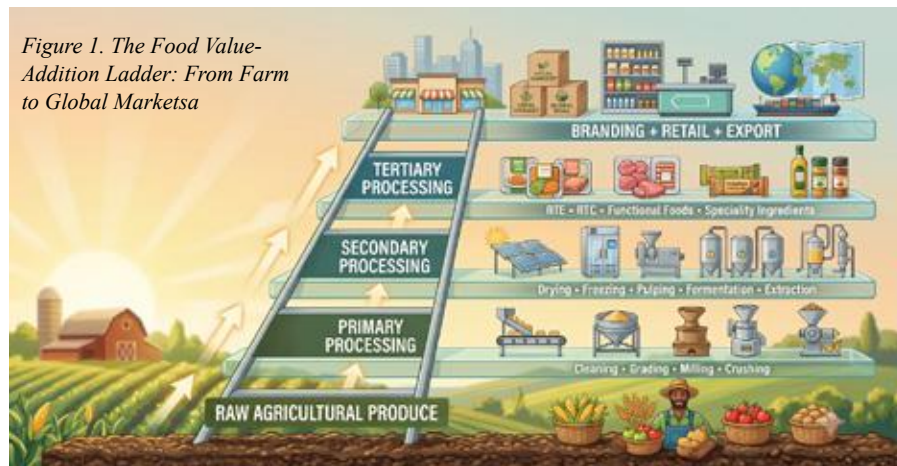
1. India's Food System: Strengths and Weaknesses

India's food system is one of the largest and most diverse in the world, providing a strong

foundation for food processing and value addition. The country has been improving its agricultural production by enhancing the productivity of the crops, irrigation, mechanisation, and supportive government policies. According to the 2026 Final Estimates of the Ministry of Agriculture & Farmers Welfare, India produced a record 357.73 million tonnes of foodgrains during 2024–25, while total horticultural production exceeded 370 million tonnes (Ministry of Agriculture & Farmers Welfare, 2026). This rich and varied raw-material resource supports a round-the-year processing capability in cereals, pulses, oilseeds, fruits, vegetables, milk, meat and aquatic products, with enormous potential for value added food and functional ingredient production, complemented by strong production in the dairy, livestock and fisheries sectors (Department of Animal Husbandry and Dairying, 2025; Department of Fisheries, 2026).

However, production alone does not guarantee economic prosperity. Despite the improvements in agricultural production, significant losses in quantity and quality of agricultural produce still occur due to poor handling and storage practices, inadequate cold-chain infrastructure, and lack of processing facilities. The post-harvest losses of the crops were in the range of 3.89–5.92% for cereals, 5.65–6.74% for pulses, 2.87–7.51% for oilseeds, 6.02–15.05% for fruits and 4.87–11.61% for vegetables (NABCONS, 2022). Similar losses are seen in animal derived products such as milk, meat, eggs and fisheries, impacting on both economic returns and the efficiency of resource use (NABCONS, 2022). These losses extend far beyond food. Each lost kilogram is the loss of irrigated land, water, energy, labour, transport and financial investment. For farmers, it translates to reduced incomes, falling market prices, and lost opportunities for value addition, especially during periods of seasonal surpluses when perishable commodities are on the market. Food processing bridges the gap between India's agricultural abundance and economic

Figure 1. The Food Value-Addition Ladder: From Farm to Global Marketsa



prosperity. Scientific grading, cold-chain logistics, drying, freezing, fermentation, extraction, packaging and advanced processing technologies are applied to convert highly perishable raw materials into safe, nutritious, value-added products, which have a longer shelf life and higher market value. Food processing is more than just a post-harvest activity, it is a critical component of the agricultural value chain, that contributes to efficient use of resources, minimise losses, improve farmer livelihoods, and boost food and nutritional security at the national level.

2. Current Status of Food Processing in India: From Production to Value Creation

The food-processing industry in India has grown from a traditional preservation industry to a strategic sector of the economy, which is connected to agriculture, services and international trade in food. Consumer demand, policy support, technological developments and private investment have led to growth in processing activities in the cereals, dairy, meat, fisheries, fruits, vegetables and ready-to-eat food sectors over the last decade. However, the level of processing is different across commodity groups, with significant potential to progress beyond primary processing to value added products.

The overall level of food processing for major commodities has been estimated to have risen from around 30% in FY2015-16 to about 52% in FY2024-25 by the Assessment of the Level of Food Processing in India (2026) by the Ministry of Food Processing Industries. However, much of this growth is concentrated in primary processing, such as milling, cleaning and grading. Secondary and tertiary processing, which generate greater economic returns through products such as convenience foods, dairy ingredients, functional foods, beverages and specialised food ingredients, account for only about one-fifth of the total processing activity. This indicates that India's greatest opportunity lies not in increasing production alone, but in expanding the depth of processing and value addition. There is also a great variation in processing across sectors. Cereals have relatively high processing levels because rice and wheat are routinely milled prior to use. On the other hand, horticultural commodities, which are produced in high volumes and perishable, still have relatively low levels of organised processing. There are similar opportunities in pulses, oilseeds, dairy, meat and fisheries, where advanced processing can enhance shelf life, product diversification, nutritional value and market value.

The sector also contributes to the external trade in India in a significant manner. According to Agricultural and Processed Food Products Export Development Authority (2025), India exported US\$51.9 billion worth of

agricultural products during 2024-25, of which US\$7.9 billion was in the form of processed food products. The significant processed food exports are cereal preparations, processed fruits and vegetables, groundnut products, processed meat products, confectionery and alcoholic beverages and other value-added food products. In the meantime, India remains a big importer of edible oils and thus, the need for increasing the processing of edible oilseed and improving the self-sufficiency in strategic commodities of food.

Although India is one of the largest agricultural producers in the world, its share in international trade of processed foods of high value is comparatively low. Product innovation, product quality, international food safety compliance, product brand and traceability, efficient logistics, are becoming an important key for the export competitiveness, not only production volumes. Exporting raw commodities or into intermediate and/or value added and specialised products offers greater opportunities to enhance export revenues and increase resilience to commodity price fluctuations.

Figure 1 shows how food processing converts agricultural production into higher value food products for domestic consumption and export markets. Each stage of processing not only increases shelf life and consumer convenience but also creates additional employment, strengthens industrial linkages and enhances export competitiveness.

3. Infrastructure, Technology and Innovation: Building a Future-Ready Food Industry

Food processing growth is not just about the number of processing units, it involves an ecosystem that connects agricultural production to cutting-edge technologies and innovation, and to modern infrastructure. While India has made tremendous strides to

improve the food processing industry, there remains a lack of cold chain coverage, logistics, storage, testing, and processing facilities. The solution to these gaps is a must to minimize post-harvest losses, ensure product quality, and competitiveness on the global market.

Infrastructure is the key to an efficient food processing system. Agricultural commodities can be transported from farms to consumers with little loss of quality using packhouses, scientific warehouses, pre-cooling facilities, refrigerated transportation, integrated cold chains, food-testing laboratories and common processing centres. Despite the improvements in infrastructure in various regions, including Government-supported projects like Mega Food Parks, Integrated Cold Chain projects and Agro-Processing Clusters, many production clusters, particularly those comprising smallholder and Farmer Producer Organisations (FPOs), still do not have access to modern infrastructure for post-harvest activities (Ministry of Food Processing Industries, 2025).

Digital transformation is not just about physical infrastructure – it's changing the way food is processed globally. Increasingly Artificial Intelligence (AI) is also being applied for automated quality inspection, defect detection, demand forecasting and predictive maintenance of processing equipment. Machine vision systems can rapidly identify fruit damage, foreign objects and grading faults, which improves the uniformity of the product and processing efficiency. Likewise, the Internet of Things (IoT) can be used to monitor the storage temperature, humidity and cold-chain logistics in real-time, thereby minimizing spoilage and providing traceability of products throughout the supply chain (Misra et al., 2017; Knorr et al., 2011).

Food manufacturing is also undergoing transformation with the advent of automation



Figure 2. Smart Food Processing Ecosystem

and robotics. Automated sorting, grading, packaging and palletising systems increase processing speed, decrease labour intensive operations and eliminate contamination risks. These technologies are already being implemented in organized food industries and multi-national companies in India, especially in the dairy, beverage, bakery products and ready-to-eat food industries. The challenge now lies in making the appropriate automation available to micro, small and medium enterprises (MSMEs) that constitute a significant portion of the food processing sector in India.

Technological innovation is also crucial in the production of high quality, minimally processed and sustainable foods. New technologies like High-Pressure Processing (HPP), High-Pressure Homogenisation (HPH), Pulsed Electric Field (PEF), Ultrasound (US), Cold Plasma, Membrane Processing and Freeze Drying are used to achieve enhanced microbial safety, retention of nutritional value, texture modification and extension of shelf-life without compromising the intensity of thermal treatment. These technologies are expected to have an increasingly important role in the production of premium, functional and clean label foods that satisfy the changing demands of consumers (Knorr et al., 2011).

Packaging has also evolved beyond its traditional protective role. Smart packaging can track the freshness of the products, extend the shelf life and enhance traceability by intelligent labels, sensors, and digital tracking systems. These innovations, coupled with blockchain traceability, enhance consumer trust and help meet the more demanding international food-safety standards. Despite these technological advances, innovation must remain inclusive. While large processing industries can afford to invest in automation and digital manufacturing, small industries can reap greater benefits from low-cost solutions like hygienic handling, solar-powered drying, modular processing equipment, and communal cold storage and testing facilities. Therefore, the technological approach of India should not only be to adopt advanced technologies, but also to ensure that innovation is cascaded down to the farmers, FPOs, MSMEs through the value chain.

Figure 2 shows a simplified framework that describes how infrastructure, digital technology and advanced processing could be combined to create a resilient and globally competitive food processing ecosystem.

4. Government Initiatives Driving India's Food-Processing Ecosystem

The Government of India has identified food processing as a key sector for agricultural transformation, job creation and export expansion and has introduced a number of flagship programmes to support this sector

by developing infrastructure, encouraging entrepreneurship and promoting private sector investment. While earlier policies were mostly around food production, recent policies have taken a value-chain approach, covering post-harvest management, processing, logistics, branding and market access.

Among these initiatives, the Pradhan Mantri Kisan SAMPADA Yojana (PMKSY) has emerged as the flagship programme for strengthening food-processing infrastructure. The scheme includes integrated cold chains, agro-processing clusters, food-testing laboratories, preservation facilities and processing units to minimize post-harvest losses and enhance value addition. The Ministry of Food Processing Industries Annual Report 2024-25 states that over 1,600 projects under various components of PMKSY have been approved and over 1,100 projects are completed/operational, which has resulted in an increase in processing capacity, modernization of post-harvest infrastructure and created significant employment opportunities across the country (Ministry of Food Processing Industries, 2025).

In addition to large scale infrastructure development, the PM Formalisation of Micro Food Processing Enterprises (PMFME) Scheme aims to boost India's extensive network of micro and small food processing businesses. The scheme is designed to promote the informal sector to become competitive and market-oriented through the credit-linked financial assistance, entrepreneurship development, skill training, common infrastructure and branding support. The One District One Product (ODOP) approach is a unique feature that encourages the production, processing, branding and marketing of district-specific agricultural products and traditional foods. According to the official programme reports, more than 2 lakh micro-enterprises have been supported through the credit linked scheme, with a large percentage of the beneficiaries being women entrepreneurs, Self-Help Groups (SHGs), and Farmer Producer Organisations (FPOs), thereby enhancing rural livelihoods and local value addition (Ministry of Food Processing Industries, 2025).

To enhance India's competitiveness in high-value food manufacturing, the Production Linked Incentive Scheme for Food Processing Industry (PLISFPI) has encouraged investments in innovative food products, branding and global market expansion. The scheme supports sectors such as ready-to-eat foods, marine products, processed fruits and vegetables, mozzarella cheese and specialty food products. As of December 2025, the participating companies had invested in India's



Figure 3. Circular Food-Processing Economy

food-processing sector, with total investment amounting to over ₹9,200 crore, indicating a rising confidence in the sector and driving increased manufacturing capacity, technological upgradation, and employment (Ministry of Food Processing Industries, 2025).

Apart from these flagship schemes, a range of other initiatives including the Agriculture Infrastructure Fund, agricultural digital platforms, export promotion schemes, quality certification systems are also strengthening the linkages between farmers and processors and markets. These interventions have collectively helped to change the policy paradigm from production to establishing integrated food value chains with the aim of boosting productivity, minimising wastage and increasing market competitiveness. The major government initiatives that are pushing the growth of the food-processing ecosystem in India have been summarised in Table 1.

5. Emerging Food Markets and India's Global Competitiveness

The global food system is changing because consumer preferences, rapid technological advances and increased awareness of health, sustainability and transparency. Consumers today are seeking safe, affordable, nutritious, convenient, eco-friendly and diet-friendly foods. These changing preferences are driving product development and hence new opportunities for countries with the ability to integrate agricultural resources with scientific innovation. The growing preference for ready-to-cook foods (RTC), ready-to-eat foods (RTE), minimally processed foods, frozen and convenience foods in India has been primarily attributed to urbanisation, lifestyle changes, higher disposable income, and the organised retail and e-commerce sector. At the same time, consumers are increasingly demanding high-protein, high-fibre, low-sugar, fortified and functional foods, and there is continued interest in organic, clean-label and plant-based foods. To facilitate this shift, the Food Safety and Standards Authority of India (FSSAI) has implemented several initiatives, including

Scheme	Primary Objective	Key Achievements*	Expected Impact
Pradhan Mantri Kisan SAMPADA Yojana (PMKSY)	Develop modern processing and post-harvest infrastructure	More than 1,600 approved projects; > 1,100 operational/completed projects	Enhanced processing capacity, reduced post-harvest losses, employment generation
PM Formalisation of Micro Food Processing Enterprises (PMFME)	Support micro-enterprises through finance, skills and branding	More than 2 lakh credit-linked enterprises supported; strong participation of women, SHGs and FPOs	Rural entrepreneurship, formalisation and ODOP-based value addition
Production Linked Incentive Scheme for Food Processing Industry (PLISFPI)	Promote investment, innovation and global competitiveness	More than ₹9,200 crore investment reported by participating companies	Expansion of manufacturing, technology adoption and export competitiveness

Table 1. Key Government Initiatives Driving Food Processing and Value Addition in India

*Figures are based on the latest official reports available at the time of writing. Source: Compiled from the Ministry of Food Processing Industries Annual Report 2024–25, PMKSY, PMFME and PLISFPI programme reports.

Eat Right India and food fortification programmes, promoting better food choices and nutritional quality (Food Safety and Standards Authority of India, 2024).

Sustainability has become another defining characteristic of modern food systems. Rather than treating processing by-products as waste, industries are increasingly adopting circular bioeconomy principles by converting fruit peels, cereal bran, oilseed cakes, whey and fish-processing residues into dietary fibre, protein ingredients, bioactive compounds, biodegradable packaging materials and renewable energy. These strategies can enhance resource use efficiency and generate new revenue streams while minimizing environmental effects.

India is one of the world's largest producers of cereals, milk, fruits, vegetables, and fisheries, but the country's contribution to the world market is relatively small in terms of value of processed high-value foods. Advanced processing, well-known food brands, innovation, efficient cold chains and adherence to international quality standards are among the factors that give the agricultural sector a much higher economic value in countries like the United States, Germany and the Netherlands. Likewise, China has been rapidly increasing its processed-food production capacity through a combination of large-scale production and export-oriented industrial policies.

For India, competing in global markets will increasingly depend on quality rather than quantity. International standards like Codex Alimentarius, effective traceability systems, accredited testing laboratories, residue monitoring, sustainable packaging and transparent supply chains are essential to success in export markets. These requirements are no longer merely regulatory obligations but have become essential elements of international competitiveness (Food and Agriculture Organization and World Health Organization, 2025).

India's competitive advantage lies in combining its rich agricultural biodiversity with modern food science. The millets, pulses, spices, tropical fruits, dairy products and traditional fermented foods have great potential for premium products, health products and export

products. Strengthening research–industry collaboration, promoting product innovation and building globally recognised Indian food brands will be crucial for transforming this potential into sustained market leadership. Figure 3 illustrates the circular food-processing economy, where agricultural biomass is converted into value-added food products, bio-based compounds, and bioenergy, promoting resource efficiency and sustainability.

6. The Road Ahead: Food Processing for a Prosperous India

India possesses all the essential ingredients to become a global leader in food processing—abundant agricultural resources, year-round production, a large domestic market, scientific expertise, and a vibrant entrepreneurial ecosystem. The next step is to speed up value addition by increasing investment in secondary and tertiary processing, modern cold chain facilities, testing labs, and decentralized processing units in the close vicinity of production clusters. Strengthening rural industrialisation and sustainable livelihoods can be further achieved by empowering MSMEs, Farmer Producer Organisations (FPOs), start-ups and women entrepreneurs. Meanwhile, the use of advanced technologies like automation, AI, digital traceability, sustainable packaging, and by-product valorisation will enhance productivity, food safety, export competitiveness, and environmental sustainability. India's future success will not only be based on increasing food production but also increasing the value of every crop.

7. Conclusion

India's greatest food-processing opportunity lies not simply in producing more food, but in creating greater economic, nutritional, and social value from every harvest. By reducing post-harvest losses, accelerating value addition, strengthening processing infrastructure, embracing innovation, and adopting sustainable technologies, the sector can enhance farmer incomes, generate quality employment, improve food security, and strengthen export competitiveness. The foundations for this transformation already exist—abundant agricultural resources, scientific capability, entrepreneurial talent, and supportive public policies. The next step is to integrate these strengths into efficient, technology-driven,

and globally competitive value chains. If every harvest is viewed as an opportunity for innovation and value creation, food processing will become a defining pillar of Viksit Bharat 2047, driving sustainable prosperity for farmers, industries, consumers, and the nation.

Author's Bio

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References

1. Agricultural and Processed Food Products Export Development Authority (APEDA) (2025) Annual Report 2024–25. New Delhi: Ministry of Commerce and Industry, Government of India.
2. Department of Animal Husbandry and Dairying (2025) Basic Animal Husbandry Statistics 2025. New Delhi: Ministry of Fisheries, Animal Husbandry and Dairying, Government of India.
3. Department of Fisheries (2026) Annual Report 2025–26. New Delhi: Ministry of Fisheries, Animal Husbandry and Dairying, Government of India.
4. Food and Agriculture Organization of the United Nations (FAO) (2024) The State of Food and Agriculture 2024: Value Addition in Agri-food Systems. Rome: FAO.
5. Food Safety and Standards Authority of India (FSSAI) (2024) Annual Report 2023–24. New Delhi: Ministry of Health and Family Welfare, Government of India.
6. Knorr, D., Froehling, A., Jaeger, H., Reineke, K., Schlueter, O. and Schoessler, K. (2011) 'Emerging technologies in food processing', Annual Review of Food Science and Technology, 2, pp. 203–235.
7. Ministry of Agriculture & Farmers Welfare (2026) Final Estimates of Foodgrain Production for 2024–25. New Delhi: Government of India.
8. Ministry of Agriculture & Farmers Welfare (2026) Final Estimates of Area and Production of Horticulture Crops for 2024–25. New Delhi: Government of India.
9. Ministry of Food Processing Industries (2025) Annual Report 2024–25. New Delhi: Government of India.
10. Ministry of Food Processing Industries (2026) Assessment of the Level of Food Processing in India. New Delhi: Government of India.
11. Misra, N.N., Koubaa, M., Roohinejad, S., Juliano, P., Alpas, H., Indicio, R.S., Saraiva, J.A. and Barba, F.J. (2017) 'Landmarks in the historical development of twenty-first century food processing technologies', Food Research International, 97, pp. 318–339.
12. NABCONS (2022) Assessment of Quantitative Harvest and Post-Harvest Losses of Major Crops and Commodities in India. Mumbai: NABARD Consultancy Services Ltd., submitted to the Ministry of Food Processing Industries, Government of India.



Jagriti Motwani, Founder and CEO, AUM Premium

“In an exclusive conversation with Food & Beverages Processing Magazine, Jagriti Motwani, Founder and CEO, AUM Premium, discusses the brand's approach to premium hydration, combining naturally sourced Himalayan spring water with an affirmation-led consumer experience. She highlights AUM Premium's focus on quality assurance, multi-stage filtration and testing, evolving consumer preferences, and the growing demand for wellness-oriented beverages. Motwani also shares the company's plans for paper-based, plastic-free packaging, its digital-first distribution strategy, and its vision for building a more sustainable and meaningful premium hydration category in India.

AUM Premium combines natural Himalayan spring water with an affirmation-led philosophy. Could you introduce the brand and share the vision behind creating a mindful premium hydration experience?

AUM Premium was created with the simple idea that a simple routine of drinking water can become a more meaningful experience. We source our water from natural Himalayan springs, where it is naturally enriched with essential minerals along with offering premium spring water. We wanted to build a brand that brings a sense of positivity into everyday life.

AUM PREMIUM: BRINGING MINDFUL HYDRATION TO INDIA'S PREMIUM WATER MARKET



That is where our affirmation-led collection approach comes in. Each bottle carries a positive affirmation encouraging people to pause, reflect and make hydration a small but meaningful part of their daily routine. For us, premium hydration is not only about the quality of the water but also about the experience surrounding it.

The premium bottled water segment is evolving rapidly. How does AUM Premium differentiate itself through product quality, natural sourcing, and consumer engagement?

Consumers today are paying much closer attention to what they buy. They want products that are authentic, well made and aligned with their lifestyle. Our water is sourced from Himalayan springs and naturally contains essential minerals such as calcium, magnesium, Bi- carbonate and potassium. Alongside product quality, we have built a brand that stands out through its affirmation-led identity. The bottle itself becomes part of the experience, creating a stronger connection with consumers than conventional packaged water. We see AUM Premium as a combination of quality, thoughtful design and a brand philosophy that people can relate to.

Maintaining the purity and natural characteristics of spring water requires advanced processing and quality controls. What technologies and testing protocols does AUM Premium follow across filtration, bottling, and quality assurance?

Protecting the natural quality of the water is our highest priority. From sourcing to bottling, every stage is managed with strict quality standards to ensure the water reaches consumers in its intended condition. The water undergoes multi-stage filtration and comprehensive physical, chemical and microbiological quality checks, while every

stage of production and packaging follows established food safety protocols to maintain consistency, purity and product integrity.

Today's consumers increasingly seek products that support both wellness and lifestyle. How are changing preferences influencing your product development and overall brand strategy?

Over the past few years, consumer behavior has changed drastically, with people becoming more conscious about their health and what they consume. While premium hydration options like alkaline and black water were already familiar among consumers, the awareness of naturally sourced alkaline spring water remained limited. This created an opportunity for AUM Premium to be introduced in the market. These changing preferences continue to shape our product development and brand strategy as we focus on meaningful innovations that combine premium hydration with wellness while strengthening our affirmation-led positioning to make AUM Premium a part of consumers' everyday routines.

Sustainability is becoming a key priority in the beverage industry. Could you elaborate on AUM Premium's initiatives in responsible sourcing, sustainable packaging, and reducing its environmental footprint?

Packaging is one of the areas where we believe meaningful improvements can be made. One of our key initiatives is the development of paper-based bottles, which we plan to introduce by the end of 2026. We have also partnered with Scrapbuddy to make bottle recycling easier for our customers and encourage responsible disposal after use. These initiatives are part of our broader effort to move towards more responsible packaging and contribute to a circular approach to waste management.

Your proposed transition to paper-based, 100% plastic-free bottles is a significant step. What challenges and opportunities do you foresee in bringing this innovation to the Indian market?

Moving towards paper-based 100% plastic-free bottles is a significant challenge because the packaging has to maintain product

integrity, quality and consumer convenience while also working efficiently across storage, transportation and distribution. The solution also needs to be scalable and commercially viable as we expand.

At the same time, we see this as an opportunity to rethink conventional packaging within the bottled water category. A lightweight responsibly sourced paper-based format can help reduce dependence on conventional plastic while improving transportation efficiency and giving consumers a more responsible alternative. For us, the objective is not to adopt sustainable packaging simply as a differentiator but to build a solution where sustainability works alongside product quality, functionality and the premium consumer experience.

With a growing presence across e-commerce and quick-commerce platforms, how important are digital channels in expanding your market reach and building stronger consumer connections?

Digital platforms have played a big role in helping us reach consumers across the country. Today AUM Premium is available through Amazon India, Blinkit, Shopify, Instamart, Jiomart, Flipkart and our own website making it easier for people to access the brand. For us, these platforms are not just sales channels but also help us to understand what consumers are looking for, how they interact with the brand and what matters most to them. That feedback is valuable because it helps us improve both the product and the overall experience.

Looking ahead, what are AUM Premium's key growth priorities, and how do you envision the future of premium, sustainable, and wellness-focused hydration in India?

Our focus over the next few years is to make AUM Premium available to more consumers while continuing to strengthen what the brand stands for, we will keep investing in better packaging solutions, expand our distribution and introduce initiatives that add value to the overall consumer experience. We are witnessing steady growth in the premium hydration category in India. Today's consumers are more and more concerned about the quality of the products they buy, how they are packaged and the values behind the brands they choose. We believe that this shift will create opportunities for brands focused on quality, thoughtful innovation and more responsible practices. That's the direction we want to continue to go as AUM Premium grows.

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Building Food-Safe Plants: How Entrance & Hygiene Automation Protects the Modern F&B Facility



“From cold-chain integrity to contamination control, automated doors, docks and touch-free hygiene systems are quietly becoming the backbone of India's food and beverage manufacturing — trusted by names such as McCain, Haldiram's, ITC, Nestlé and Mother Dairy.

For a food or beverage manufacturer, every open doorway is a decision about risk. A few seconds of an exposed opening can mean a rush of warm, humid air into a chilled zone, an invitation to flying insects, a spike in energy cost, or a break in the hygiene barrier that regulators and auditors watch so closely. As Indian food processors scale up to meet domestic demand and export standards, the humble entrance — the door, the dock, the wash-station — has moved from an afterthought to a genuine control point in food safety and operational efficiency.

This is the space Toshi Automation Solutions has occupied for over three decades. Best known across India's pharmaceutical and industrial sectors, Toshi's entrance, secured-entrance and hygiene automation systems are increasingly specified in food and beverage plants where the demands of FSSAI compliance, HACCP discipline and cold-chain reliability meet the everyday reality of high-traffic production floors.

The invisible threats: contamination, pests and cross-traffic

Food-grade environments live and die by segregation — keeping raw from cooked, dirty from clean, outside from inside. Conventional manual or slow-rolling doors leave openings exposed far longer than necessary, allowing airborne dust, micro-organisms and pests to move between zones. Toshi's high-speed doors close the gap, literally: opening and closing in a fraction of the time of a standard shutter, they minimise the window in which contaminants can travel, while their smooth, cleanable surfaces resist the build-up that harbours bacteria.

Where an opening must stay usable but protected, air curtains and PVC strip curtains

form an invisible barrier — holding back flying insects, dust and temperature exchange without impeding the flow of people and pallets. Together with sectional and rolling closures at the building envelope, these create the layered defence that food-safety auditors expect to see.

Protecting the cold chain, cutting the energy bill

For dairy, frozen foods, ready-to-eat and beverage cold storage, temperature is the product. Every door cycle into a chilled or frozen room is a small leak of costly conditioned air and a small risk to product integrity. Toshi's insulated cold storage doors and rapid high-speed doors are engineered precisely for this: they seal tightly, open and close quickly, and hold temperature differentials that keep the cold chain intact from processing to dispatch.

The commercial upside is immediate. Faster cycles and better sealing mean refrigeration systems work less to recover lost temperature — reducing energy consumption and HVAC load, and easing wear on plant equipment. In a sector where margins are tight and power is a major cost line, the door pays for itself.

The loading dock: where product meets the outside world

The dispatch bay is one of the most vulnerable points in any food plant — the moment refrigerated goods are exposed to ambient conditions and to the outside environment. Toshi's dock levelers bridge the gap between floor and vehicle bed smoothly and safely, speeding up loading while preventing the jolts and drops that damage packaged product. Paired with dock shelters and seals, they close the envelope around a docked truck, so chilled goods move from cold room to

cold truck with minimal thermal and hygienic exposure. The result is faster turnaround, safer material handling for workers, and a tighter barrier against dust, rain and pests at exactly the point where the plant is most open to them.

Touch-free hygiene at every threshold

Hand hygiene is the first and most audited line of defence in food handling. Toshi's contactless hygiene range — sensor taps, automatic soap and sanitiser dispensers, touch-free hand dryers and sensor-operated washroom fittings — removes the shared touchpoints where cross-contamination begins. For a plant working toward HACCP or global retailer audits, automated hygiene stations at entries, changing rooms and production thresholds are both a compliance asset and a visible signal of food-safety culture.

What automated entrances deliver on the plant floor

- Contamination control — high-speed doors, air curtains and strip curtains keep dust, pests and micro-organisms out of clean zones.
- Cold-chain integrity — insulated and rapid doors hold temperature and protect frozen, chilled and dairy product.
- Lower energy cost — reduced air exchange means lighter refrigeration and HVAC loads.
- Faster throughput — quick cycles and smooth dock levelers speed movement of people, pallets and vehicles.
- Audit-ready hygiene — touch-free taps, dispensers and dryers support FSSAI and HACCP compliance.
- Worker safety — smooth dock transfers and automated openings reduce manual handling injuries.

Trusted where standards are highest

Toshi's credibility in food and beverage is built on the plant floors of India's most recognised names. Its systems are deployed with processors and brands including McCain Foods, Haldiram's, ITC, Nestlé, Mother Dairy and Patanjali — alongside a wider client base spanning pharmaceuticals (Cipla, Lupin, Abbott, Zydus), automobiles (Maruti Suzuki, Honda, Hero) and warehousing. The same engineering discipline that satisfies pharma cleanroom requirements translates directly to the hygiene and precision that food manufacturing demands.

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Are you Testing the Metal Detector Correctly, without Slowing your Line?



Kati Hope, Global Key Account Manager, Mettler-Toledo Product Inspection



Metal detector testing can look like a simple process. Pass a test piece through, check the result, record it and carry on. However, this is an area that frequently catches manufacturers by surprise and can leave them exposed to unnecessary risk. The value of a test is not speed. It is whether it proves the detector can still protect the line and meet the standards of retailers and regulatory requirements.

Why does testing matter?

A metal detector is qualified to meet a specific challenge. At installation, it should be validated for the product, pack format, packaging, and expected contaminant risk. If those factors change significantly, re-validation may be needed. An initial performance verification process will confirm the system is capable of meeting the specified sensitivity standard.

Routine performance monitoring proves the initial metal detection standard has not drifted. This could be from product changes, line changes or detector functionality. Without that proof, operators may believe that their products are being protected when in fact the detector is no longer finding the smallest contaminant it was specified to detect. The

Automated testing can make checks more consistent and less disruptive. The Mettler Toledo INFINITY-Electronic Test System, for example, injects a signal equivalent to the geometric centre of the aperture, equivalent to predetermined positions on the pack, supporting repeatable tests at challenging positions. Automation is not a shortcut around good practice. Manufacturers still need a documented routine, clear quarantine rules, rejection checks, and records that show the system was working as intended. However automated testing is more accurate, saves time and money, and will record all activities digitally.

result can be costly recalls, failed audits, and wasted product, all of which can lead to significant costs.

How often is often enough?

Testing frequency is not a generic daily task. It is set by the application, HACCP plan, food standard and customer or retailer Code of Practice. Some major UK retailer codes go beyond a simple pass or fail check, requiring defined routines such as consecutive pack tests, memory tests, large metal tests, or

specific leading edge, middle, and trailing edge positions.

Quarantine is also key. Product should not leave site until there is evidence that the detector was working during the period in which it was made. If a line produces one tonne an hour and the site can hold only two tonnes in quarantine, testing every two hours may be right. Testing once at the start of the day may look tidy on paper, but it may not protect product already in the supply chain.

Where do tests go wrong?

The most common problem is not that manufacturers forget to test. It is that the test does not challenge the detector in the right way. On horizontal conveyors, the least sensitive point is normally the geometric centre of the aperture. For packed products, many GFSI-recognised Standards and Retailer Codes of Practice may suggest testing at defined points in the product flow, commonly the leading edge, middle, and trailing edge.

That can be difficult on a busy line, particularly with larger products or packs that sit close to the aperture. To reduce testing time, some manufacturers use prepared test packs or samples, with the test piece already positioned in the right place which is typically at points of the product closest to the centre of the aperture. Used properly, this can make testing quicker and more repeatable. But the sample must still represent the worst case. Simply placing a test piece on top of a pack can create false confidence, because it may pass through a more sensitive part of the aperture.

Testing routines can differ depending on whom manufacturers are supplying. Some may only need to follow GFSI-recognised standards where others may need to do further testing if they have to follow specific Retailer Codes of Practice. This means one test method will not suit every line, product or manufacturer.

What else should the test prove?

Detection is only half the job. The system must also remove contaminated product and stop it being reintroduced to the line. That means the reject mechanism, reject confirmation, bin full monitoring, lockable reject bins, alarms, and failsafe systems all matter.

For example, if the system detects contaminants in a pack but does not reject the product, then the system must not allow that pack to pass further down the line. Furthermore, a rejected pack must not be able to be lifted from the reject bin and put back into production as it leaves the site exposed. Measures should be put in place to prevent this from happening. Rejected product should also be investigated.

The question is not only what was found, but how it entered the process and what should change.

Can automation improve the process?

Manual testing can be slow and inconsistent. It may need one or two operators, interrupt production and create paper records for audits. It also leaves room for human error when test pieces need accurate placement. In addition, manual testing carries a greater risk that records could be falsified. For example, to save time, an operator relying solely on manual test processes could simply tick a box on a checklist to indicate a test has been run even when it hasn't.

Automated testing can make checks more consistent and less disruptive. The Mettler Toledo INFINITY-Electronic Test System, for example, injects a signal equivalent to the geometric centre of the aperture, equivalent to predetermined positions on the pack, supporting repeatable tests at challenging positions. Automation is not a shortcut around good practice. Manufacturers still need a documented routine, clear quarantine rules, rejection checks, and records that show the system was working as intended. However automated testing is more accurate, saves time and money, and will record all activities digitally.

Why are records important?

Auditors need evidence of what happened, when it happened, and what action followed. Manual records can be difficult to manage across multiple lines, but Wi-Fi data transfer can simplify this process. Digital data capture can store results centrally and make them easier to retrieve. ProdX™ data management software from Mettler Toledo, for example, can collect and store compliance-relevant data from connected inspection equipment.

As due diligence expectations become tighter, the best testing routines combine practical line protection with clear evidence; testing in the right place, at the right frequency, with the right records to prove it.

For more information, download the Mettler Toledo Metal Detection Guide on Testing Processes by clicking here or visit: www.mt.com/test-md-pr

Powerful, compact and ready to use NORDAC FUSION: combines motor and inverter into a compact high-performance unit

With NORDAC FUSION, NORD DRIVESYSTEMS launches a powerful drive system that combines motor and inverter into a compact unit. Thanks to the optimal electrical and mechanical adjustment of both components, NORDAC FUSION achieves high power density, while particular attention was given to keeping the installation space as small as possible. Users benefit from a ready-to-use system that operates reliably once connected. This eliminates extensive parameterisation or time-consuming selection of components. NORDAC FUSION is the answer for everyone, who looks for maximum drive power in a very small space – simple, quick and efficient.

For logistics projects with a high level of automation, this means: less engineering efforts per drive axle, faster commissioning and consistently high drive quality – from the first conveying point to the last transfer station. NORDAC FUSION's decentralised design furthermore allows for direct mounting on the respective unit. Centralised control cabinets are thus no longer required and wiring efforts are considerably reduced.

NORDAC FUSION – Various combinations

NORDAC FUSION combines asynchronous motors (IE3) and permanent magnet synchronous motors (IE5+) in ventilated and unventilated versions with a decentralised NORDAC ON frequency inverter. The optimised motor/inverter combinations cover a power range from 0.31 to 3.7 kW. They feature consistent safety and communication properties, are suitable for worldwide use, and can be ideally complemented with a gear unit from the manufacturer's modular product range.

The decentralised frequency inverters are characterised by their compact design, full plug-in capability and high reliability. Special features include the integrated PLC and their multi-protocol Ethernet interface. PROFINET, EtherNet/IP and EtherCAT can be easily set via parameters. Integrated safety functions enable safe operation of almost all motion sequences in automated production.

Advanced communication and safety functions

Apart from STO and SS1, the NORDAC ON series will also feature the motion monitoring function SLS, SMS or SSM for fail-safe control of the rotary movement. They can be integrated via PROFIsafe or FSoE into a fail-safe



application within an existing Industrial Ethernet network. Stand-alone use is also possible. The safe digital inputs and outputs can be used to incorporate fail-safe peripheral components or functions. Emergency stop buttons, safety door switches, photoelectric sensors, etc. can thus be connected directly. Two safe single-channel digital inputs can be combined into one safe two-channel digital input, and two safe outputs can be combined into one safe two-channel output. The level of functional safety can thus be individually set with NORDAC FUSION as well.

Encoderless control in dynamic applications

Another advantage is the encoderless control of NORDAC FUSION with the manufacturer's highly efficient IE5+ synchronous motors (PMSM). Using the CFC open-loop injection method, the motor's rotor position and speed can be captured without additional sensors. With this, NORD offers a robust, streamlined and economical drive solution that is also suitable for dynamic applications.

Highly efficient IE5+ motor technology

NORD's highly efficient IE5+ permanent magnet synchronous motors (PMSM) are characterised by a constantly high efficiency of up to 95% over a wide torque range. In partial load and partial speed ranges, they therefore achieve optimum energy consumption performance and allow for a reduction of variants for more streamlined production, logistics, warehousing and service processes.

Ideal for demanding environments

The NORDAC FUSION drive solution can be used up to a temperature of -30 °C. The combination of IE5+ synchronous motors and NORDAC ON PURE with NXD tupH® is, for example, suitable for wash-down applications in the food sector. Ethernet on board, hybrid cables and daisy chain technology enable efficient and hygienic topologies that are more streamlined and easier to clean than conventional decentralised wiring.

www.nord.com

New Bühler Olfc Flaker Combines Longer Roll Life, Lower Vibration, and Smarter Operation



Swiss technology group Bühler launched the OLFC, a new flaker system for processing oilseeds. To help processors reach higher productivity levels and keep production running around the clock, the OLFC features a robust structure that reduces vibration by up to 25% compared to its predecessors and larger rolls that more than double service life. Integrated sensor technology, automation, and connected digital services give operators real-time insights into machine performance, supporting them to identify maintenance needs early and reduce production disruptions.

Flakers are used in oilseed processing plants to press cracked seeds, such as soybean, canola, and sunflower seeds, into thin flakes before oil extraction, a step that runs continuously. With each OLFC flaker processing up to 500 tonnes per day and plants operating several production lines with numerous flakers, equipment reliability is a key operational requirement. Unplanned downtime reduces throughput and disrupts production schedules. Flaking also plays an important role in oil extraction as the size, thickness, and thickness consistency of the flakers influence how efficiently oil can be extracted further in the process.

Solid foundation

To address reliability under continuous operation, Bühler's engineering team, together with customers, identified components subject to the highest mechanical stress and reinforced them in the OLFC. Changes include a strengthened base frame, cast components in the bearing unit, larger-diameter pulleys to reduce belt load, reinforced roll shafts, and revised motor

fixation to the base frame. Together, these changes reduce machine vibration by up to 25% while creating a more robust platform for long-term operation.

The newly launched OLFC also features larger rolls, with a diameter of 820 millimeters (mm) compared with the industry standard of 800 mm. Combined with an extended usable diameter, this increases roll service life by 150%, reducing replacement frequency and lowering the total cost of ownership.

In addition, the OLFC comes with an upgraded hydraulic system that helps protect it from sudden pressure spikes, including those caused by foreign objects entering the equipment. This reduces the risk of unexpected stoppages and helps keep maintenance costs under control.

The OLFC uses a timing belt that transfers power more efficiently than conventional belt systems. As a result, the solution consumes up to 4% less energy than its predecessors.

The maintenance benefits are also significant. An auxiliary drive rotates the rolls at low speed during grinding, allowing safer and more efficient roll service. This simplifies routine interventions and helps minimize downtime. Saving two hours can preserve around 41 tonnes of processing capacity per flaker.

"Every major design decision in OLFC was driven by one objective: helping customers maximize uptime. From the reinforced frame and reduced vibration to longer-lasting rolls and easier maintenance, we focused on creating a machine that delivers reliable

performance throughout its lifecycle," said Lukas Spannagl, R&D Project Manager Value Nutrition at Bühler.

Built to stay ahead

The OLFC integrates mechanical improvements with a completely redesigned automation system. A new touchscreen with clear, intuitive graphics gives operators a real-time view of the machine's status. The simple interface reduces complexity and helps operators quickly find the information they need. An integrated sensor system provides real-time insights into machine performance. Operators can also consolidate data from multiple flakers to compare performance and identify maintenance before they become critical. Using Bühler Insights, the company's digital platform for machine monitoring and analytics, they can monitor long-term trends and optimize maintenance planning.

"To make operation of the machine as seamless as possible, we have adopted a more intuitive design language that operators inherently understand, making the system easier to learn and faster to master," said Abdulqadir Abshir, Product Manager Value Nutrition at Bühler. "For that, we combined new sensors, meaningful data visualization, and customer feedback to make it easier to see what's happening in the process and take action."

As processors face growing labor shortages and a decline in experienced personnel, embedded process expertise can help operators make better decisions and maintain consistent performance.

Developed with customer feedback

The OLFC was developed in close collaboration with customers across major oilseed processing regions, including North America, Europe, and China. Customer feedback shaped multiple aspects of the machine, from usability and maintenance access to digital insights and sensor placement. Bühler validated the design through two prototype installations at soybean processing plants based in the United States. One of the units has been operating under real production conditions since October 2023.

Following successful validation in commercial soybean processing plants, the OLFC is now available to customers worldwide.

www.buhlergroup.com



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Smart Packaging, Smarter Shelf Life: Innovations in Food Preservation and Freshness Monitoring

Ritesh Verma



“Food packaging is moving beyond its traditional role as a passive barrier designed to protect products from physical, chemical and microbial deterioration. With food manufacturers facing increasing pressure to extend freshness, reduce waste, improve traceability and maintain quality throughout complex supply chains, packaging is becoming more functional and responsive. Active and intelligent packaging technologies are at the forefront of this shift, enabling packages to interact with their internal environment and, in some cases, provide real-time signals about product condition.

From oxygen scavengers and antimicrobial materials to time-temperature indicators, freshness sensors and connected labels, these technologies are creating new possibilities for managing food quality and shelf life. While active packaging works to influence the conditions surrounding the product, intelligent packaging monitors changes and communicates information about them. Together, they are helping the food industry move towards a more dynamic approach to preservation, where packaging can play a proactive role in maintaining quality and identifying potential spoilage.

Food packaging is undergoing a significant transformation as manufacturers look beyond the traditional role of protecting products from physical damage and environmental exposure. Conventional packaging primarily acts as a passive barrier against oxygen, moisture, light, microorganisms and other external factors. However, changing consumer expectations, stricter food-safety requirements and the need to reduce food waste are driving interest in packaging systems that can actively interact with food or communicate information about its condition.

Active and intelligent packaging technologies are emerging as two important components of this transition. While active packaging

is designed to influence the condition of the packaged food or its surrounding environment, intelligent packaging monitors specific conditions and provides information about the product, package or supply chain. Together, these technologies can support more effective shelf-life management, quality assurance and spoilage detection.

From Passive Barrier to Functional Packaging

Traditional packaging is designed to maintain a stable environment around the product. Its effectiveness depends largely on controlling the movement of oxygen, water vapour, carbon dioxide, aromas and light through the package. While high-barrier films, modified-atmosphere packaging

and vacuum packaging have significantly improved food preservation, they do not necessarily respond dynamically when conditions change.

Active packaging introduces additional functionality. It may absorb unwanted substances, release beneficial compounds or regulate the internal atmosphere of a package. Oxygen scavengers, moisture absorbers, carbon dioxide emitters, antimicrobial packaging and ethylene scavengers for fresh produce are examples of active systems. Intelligent packaging takes a different approach. Instead of primarily preserving the product, it monitors and communicates information. Time-temperature indicators, freshness indicators, gas sensors, leak indicators and data-enabled labels can provide signals about whether a product has experienced conditions that could affect its quality or safety.

How Active Packaging Extends Product Life

The underlying objective of active packaging is to control factors that accelerate deterioration. Oxygen, moisture, microbial growth and undesirable gases are among the principal causes of food quality loss. Oxygen scavenging systems can reduce residual oxygen inside a package, helping to slow oxidation and protect products susceptible to rancidity, colour changes and flavour deterioration. They can be incorporated into sachets, labels, closures or packaging materials, depending on the application.

Moisture control is another important area. Excess moisture can cause products such as biscuits, crackers and snacks to lose their crispness, while inadequate moisture can affect the texture of bakery products. Moisture absorbers and moisture-regulating materials can help maintain a more suitable internal environment. For fresh produce, ethylene management is particularly relevant. Ethylene is a naturally occurring plant hormone that can accelerate ripening and senescence. Active packaging systems incorporating ethylene scavenging technology can help manage ethylene concentration and potentially slow quality deterioration in selected fruits and vegetables.

Antimicrobial Packaging and Microbial Control

Microbial growth is one of the most important causes of food spoilage and can also create food-safety risks. Active antimicrobial packaging aims to inhibit or delay the growth of microorganisms on or around the food surface. Antimicrobial systems can use a variety of active substances, depending

on regulatory approval and the intended application. These may include organic acids, essential-oil-derived compounds, enzymes, bacteriocins and other antimicrobial agents. They can be incorporated into packaging materials or designed to migrate in a controlled manner into the package environment.

The technology is particularly relevant for foods where microbial growth is a major shelf-life limitation, including meat, seafood, dairy products, bakery products and some ready-to-eat foods. However, antimicrobial packaging is not a replacement for good manufacturing practices, hygienic processing or appropriate temperature control. Its role is to provide an additional preservation mechanism within a properly controlled food system.

Intelligent Packaging: Making Product Condition Visible

While active packaging interacts with the food environment, intelligent packaging focuses on monitoring and communication. This distinction is important because food quality does not always correspond to the printed expiry date. A product may experience temperature abuse, package leakage or other adverse conditions during transportation and storage. Intelligent packaging can provide information about such events and, in some applications, indicate changes associated with freshness or spoilage.

Time-temperature indicators are among the most established examples. These labels respond to cumulative temperature exposure over time and can provide a visual indication that a product has experienced conditions outside its intended storage range. For temperature-sensitive foods, such systems can provide an additional layer of information for logistics operators, retailers and consumers.

Dynamic Shelf-Life Assessment

One of the most promising concepts in intelligent packaging is dynamic shelf-life assessment. Conventional date labelling generally assumes that the product has been stored under defined conditions throughout its distribution and retail journey. In reality, temperature and environmental conditions can fluctuate. A chilled food may spend time at a temperature higher than recommended during transportation, loading, unloading or retail handling. A fixed date printed on the package cannot reflect these variations.

Dynamic systems aim to provide a more condition-sensitive assessment by monitoring relevant parameters. Sensors

or indicators can track temperature history, gas composition, pH-related changes or other markers associated with product deterioration. This could allow stakeholders to make more informed decisions about product quality rather than relying solely on a predetermined date. The long-term potential is significant because better shelf-life visibility could help reduce unnecessary food disposal while maintaining appropriate safety controls.

Spoilage Sensing Through Chemical and Biological Signals

Food spoilage often produces measurable changes before deterioration becomes obvious to consumers. These changes may include the formation of volatile organic compounds, changes in pH, production of carbon dioxide or ammonia, oxygen depletion and alterations in microbial metabolites.

Intelligent packaging can be designed to respond to these signals. Colour-changing indicators, for example, can be engineered to respond to changes in the package atmosphere. In meat and seafood applications, volatile nitrogen compounds and other metabolites associated with microbial activity may serve as targets for freshness sensing. For products packed under modified atmospheres, monitoring oxygen and carbon dioxide concentrations can also provide information about package integrity and product condition. An unexpected change in gas composition may indicate leakage or biological activity.

The challenge is developing sensors that are sufficiently selective and reliable to distinguish genuine spoilage-related changes from normal variations within the product.

Sensors, Indicators and Digital Connectivity

The next stage of intelligent packaging is increasingly connected. Printed electronics,

RFID, NFC and other digital technologies can link packaging with information systems and provide data beyond a simple visual indicator. A package could potentially carry information about production, transportation conditions, temperature exposure and product status. When integrated with supply-chain systems, this information can help manufacturers and retailers identify weak points in distribution and storage.

Digital connectivity can also support traceability and inventory management. Sensors combined with data analytics may allow businesses to identify products requiring priority sale or intervention, potentially reducing waste caused by unnecessary disposal. The convergence of sensing technology, packaging materials and digital platforms is therefore creating a more data-driven approach to food quality management.

Applications Across Food Categories

The requirements for active and intelligent packaging differ significantly across food categories. Fresh meat and seafood are strong candidates for freshness indicators because microbial deterioration can be associated with measurable changes in volatile compounds and package gases.

Dairy products can benefit from systems that monitor temperature exposure and potentially detect changes in package atmosphere. Bakery and snack products can use oxygen and moisture management technologies to protect texture, flavour and oxidative stability. Fresh produce presents opportunities for ethylene management, humidity control and freshness monitoring. Ready-to-eat meals and chilled foods can benefit from temperature indicators and package-integrity monitoring. The technology must therefore be designed around the specific deterioration mechanism of each product rather than treated as a one-size-fits-all packaging solution.



Food waste reduction is one of the strongest arguments for intelligent packaging. A significant amount of food is discarded because of uncertainty about quality, inappropriate storage or conservative shelf-life assumptions. If packaging can provide more accurate information about actual product conditions, it may help distinguish food that remains suitable from food that genuinely requires disposal. This could be particularly valuable for perishable products moving through complex supply chains. However, intelligent packaging should complement rather than replace established food-safety systems. A freshness indicator cannot independently guarantee that a product is safe to eat. Its effectiveness depends on appropriate sensor design, calibration and interpretation.

Regulatory and Safety Considerations

Despite their potential, active and intelligent packaging systems face important regulatory and technical requirements. Any substance intentionally released from packaging into food must meet applicable safety and migration requirements. Sensor components and indicators must also be suitable for their intended use and should not compromise food safety.

Clear communication is equally important. A colour-changing indicator, for example, needs to provide an interpretable signal that consumers and supply-chain personnel can understand correctly. An ambiguous or poorly calibrated indicator could create unnecessary food waste or, more seriously, provide false reassurance. Manufacturers therefore need to validate the relationship between the packaging signal and actual product quality under realistic storage conditions.

Reducing Food Waste Through Better Information

Food waste reduction is one of the strongest arguments for intelligent packaging. A significant amount of food is discarded because of uncertainty about quality, inappropriate storage or conservative shelf-life assumptions. If packaging can provide more accurate information about actual product conditions, it may help distinguish food that remains suitable from food that genuinely requires disposal. This could be particularly valuable for perishable products moving through complex supply chains. However, intelligent packaging should complement rather than replace established food-safety systems. A freshness indicator cannot independently guarantee that a product is safe to eat. Its effectiveness depends on appropriate sensor design, calibration and interpretation.

Challenges to Commercial Adoption

Cost remains one of the major barriers to wider adoption. Conventional packaging

is produced at enormous scale, while sophisticated sensors and digital components can increase material and manufacturing costs. Integration into existing packaging lines is another challenge. Active components and indicators must withstand filling, sealing, transportation and storage processes without affecting packaging performance. Consumer acceptance is equally important. Packaging technologies must be intuitive and transparent, particularly when visual indicators communicate information about freshness. Recycling and end-of-life considerations also need to be addressed as packaging structures become more complex.

For intelligent packaging to become mainstream, the benefits in terms of reduced waste, improved quality control and supply-chain efficiency must justify the additional cost and complexity.

The Road Ahead

The future of active and intelligent packaging is likely to involve greater integration between functional materials, sensors and digital platforms. Advances in printed electronics, nanomaterials, biosensors and smart polymers could enable smaller, lower-cost and more sensitive monitoring systems.

Artificial intelligence and data analytics may further enhance these technologies by interpreting information from multiple variables rather than relying on a single indicator. Temperature, humidity, gas composition and time could potentially be evaluated together to provide a more comprehensive picture of product condition. For food manufacturers and packaging companies, the opportunity extends beyond simply increasing shelf life. The broader objective is to create packaging that can respond to changing conditions, provide meaningful information and support better decisions throughout the food supply chain.

Active and intelligent packaging represents an important shift from packaging as a passive protective layer to packaging as an active participant in food quality management. By controlling the package environment and sensing changes associated with deterioration, these technologies can contribute to longer freshness, improved traceability and reduced food waste. Their successful adoption will depend on balancing technical performance, regulatory compliance, affordability, recyclability and consumer understanding. As the food industry moves toward more connected and resource-efficient supply chains, packaging that can not only protect food but also communicate its condition is likely to become an increasingly important part of the next generation of food preservation and quality-management systems.

EXHIBITIONS & CONFERENCES 2026-2027

PackVision Expo - 2026

15 - 17, October - 2026

Chennai Trade Centre

Intralogistics & Warehousing Expo - 26

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FoodVision Expo - 2026

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19 - 21, Nov - 2026

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3 - 5, Dec - 2026

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Annapoorna Inter Food - 2026

9 - 11, Dec - 2026

Bombay Exhibition Centre, Mumbai

Inter FoodTech - 2027

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Bharat Packaging Expo - 2027

30 Aug - 1 Sept - 2027

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Packaging Robots Market: Automation Drives the Next Phase of Packaging Innovation

The global packaging robots market is entering a sustained growth phase as manufacturers respond to rising labour costs, workforce shortages, stringent safety regulations and the need for flexible, high-speed production. The market is estimated at US\$12.5 billion in 2026 and is projected to reach US\$17.5 billion by 2033, expanding at a CAGR of 4.9% between 2026 and 2033. Food and beverage, pharmaceuticals, consumer goods and e-commerce fulfilment are among the major sectors driving demand for robotic packaging solutions.

Automation Driven by Labour and Productivity Challenges

Rising labour costs and shortages of skilled workers are accelerating automation across packaging operations. Repetitive activities such as picking, packing, case handling and palletizing are increasingly being automated to maintain consistent throughput and reduce dependence on manual labour. The International Federation of Robotics (IFR) has reported strong investment in industrial robotics as manufacturers seek greater productivity and operational consistency. On high-volume packaging lines, robotic systems can provide attractive returns by operating continuously at predictable speeds while reducing labour requirements. This is particularly relevant in developed markets where wage inflation and labour availability are affecting production economics.

Food Safety and Pharmaceutical Compliance

Regulatory requirements are also strengthening the business case for robotic packaging. In food processing, automated handling can reduce unnecessary human contact with products and help minimise contamination risks. Robots can also be integrated with machine vision, checkweighing, inspection and traceability systems to create more controlled packaging processes. Pharmaceutical manufacturers face even stricter requirements for validated, repeatable and traceable operations. Serialization, product identification and Good Manufacturing Practice requirements are encouraging greater use of robotics in pharmaceutical packaging. As production of biologics and other high-value medicines increases, automation is

becoming an important component of controlled packaging environments.

High Investment and Integration Remain Challenges

Despite its advantages, packaging robotics requires significant initial investment. A complete robotic packaging cell may involve the robot, end-of-arm tooling, vision systems, conveyors, safety equipment, software and system integration. This can create a significant capital burden for small and medium-sized manufacturers. Integration with existing packaging infrastructure is another challenge. Many food, beverage and consumer goods plants operate equipment installed more than 10 years ago. Connecting modern robots with legacy machinery can require customised engineering, software interfaces and production downtime. High reconfiguration costs can also make automation difficult for facilities handling numerous SKUs and frequent format changes.

Cobots Expand the Addressable Market

Collaborative robots, or cobots, are creating new opportunities, particularly for SMEs. Their compact footprint, simplified programming and ability to work alongside operators in appropriate applications can reduce the complexity of automation projects. Cobots are increasingly being used for pick-and-place, case packing, palletizing and secondary packaging. Their flexibility allows manufacturers to redeploy systems between production tasks, making them attractive for facilities handling multiple products and frequent changeovers. Lower installation requirements compared with conventional robotic cells are also helping bring automation within reach of smaller manufacturers.

E-Commerce Fuels Secondary Packaging Automation

The continued expansion of e-commerce is creating strong demand for automated secondary and tertiary packaging. Fulfilment centres must process varying product sizes, order combinations and packaging formats at high speed, making flexibility essential. Robotic systems for case packing, sorting, palletizing and product handling can deliver consistent throughput while reducing manual intervention. High-speed, vision-guided robots capable of handling variable formats are therefore becoming increasingly important as distribution centres make long-term investments in automated fulfilment infrastructure.

Pick and Place Leads Applications

By operation type, pick and place is expected to account for approximately 38% of the

packaging robots market in 2026, making it the leading application. Its broad use across food, beverage, pharmaceutical and consumer goods packaging makes it a common starting point for automation projects.

By robot type, SCARA robots are expected to hold approximately 32% market share in 2026. Their speed, precision and repeatability make them suitable for high-volume pick-and-place applications. At the same time, articulated robots, delta robots and cobots are expanding their presence across specialised packaging operations. The food and beverage industry is projected to account for around 35% of market revenue in 2026, making it the largest end-use sector. Pharmaceutical packaging is among the fastest-growing applications, supported by increased production, serialization and regulatory requirements.

Asia Pacific Leads Global Demand

Asia Pacific is expected to command approximately 41% of global packaging robot revenues in 2026, supported by China's extensive manufacturing base, Japan's advanced robotics ecosystem and India's expanding food, pharmaceutical and FMCG industries.

India represents approximately 7% of Asia Pacific revenues and is among the region's faster-growing markets. Pharmaceutical manufacturing, food processing, organised retail and e-commerce are creating increasing demand for automated packaging. Southeast Asia is also emerging as a significant growth centre as manufacturing investment expands across Vietnam, Thailand and Indonesia. North America is expected to account for approximately 24% of global revenues, while Europe represents around 22%. The Middle East and Africa is projected to be the fastest-growing regional market, supported by food processing expansion, pharmaceutical manufacturing and industrial diversification initiatives.

Competitive Outlook

The market features established robotics companies including ABB, FANUC, KUKA, YASKAWA and Mitsubishi Electric, alongside packaging automation specialists such as Syntegon Technology and Schubert Group. Competition is increasingly focused on speed, flexibility, machine vision, end-of-arm tooling, software integration and total cost of ownership. As manufacturers move towards connected and flexible production, packaging robots are evolving from standalone automation equipment into integrated components of smart manufacturing systems. With the market projected to reach US\$17.5 billion by 2033, robotics is set to play an increasingly important role in improving packaging productivity, consistency, safety and flexibility across global manufacturing.

persistence market research

Competek highlights its complete optimization journey for lightweight PET bottles



Reducing the weight of a PET bottle is not simply a matter of using less material. As manufacturers look to reduce raw material consumption, improve efficiency and meet sustainability goals, achieving meaningful weight reductions while maintaining bottle and production line performance requires a targeted approach to preform design, bottle geometry and material distribution.

Through its Packaging Optimization approach, Competek supports manufacturers and brand owners throughout the entire lightweighting process, acting as a single partner throughout the lightweighting journey, from packaging design and development through to industrialisation, line implementation and ongoing production optimisation.

"Successful lightweighting requires a clear understanding of the production process, line requirements and bottle lifecycle", said Luca Baldessin, Research and Development Manager at Competek. "As a single partner throughout the process, we combine engineering expertise with testing, validation and production support to help customers develop lighter bottles that are optimised for real manufacturing environments while maintaining performance and quality."

Turning lightweight designs into production-ready bottles

When designing a lightweight bottle, it is essential to understand how packaging changes will affect production performance. To aid this, Competek has developed a

comprehensive set of procedures and tests aimed at ensuring feasibility and performance throughout the development process.

With more than 30 years of experience in PET packaging, Competek identifies the most effective optimisation opportunities to achieve the right balance between weight, strength, processability, cost efficiency and sustainability. The process begins with a technical assessment of customer requirements and continues through design, simulation, testing and performance validation.

The company's approach goes beyond bottle development. Through in-house packaging tests, line trials and on-site assistance, Competek works alongside customers throughout the industrial process, providing a single point of contact to optimise blowing parameters, production recipes and overall packaging performance.

Delivering measurable results

This end-to-end expertise enables manufacturers to reduce raw material consumption, lower production and logistics costs, optimise PET usage and decrease the environmental impact of their packaging.

Projects developed by Competek demonstrate that it is possible to significantly reduce bottle weight while maintaining the required levels of functionality, strength and performance. Its technical teams also help customers select the most suitable mould solution to ensure optimum production performance, efficiency and packaging quality. The goal is to ensure that improvements achieved during development are successfully translated into reliable and efficient production performance.

Condition monitoring prevented the product loss of 288,000 bottles at Britvic facility

Unplanned downtime remains one of the biggest hidden costs in food, beverage, dairy, pharma and other hygienic industries. Yet many manufacturers still rely on scheduled inspections or react only when equipment failure occurs.

A case story from one of the UK's largest soft drink manufacturers, Britvic, demonstrates how AI-powered and industry intelligent condition monitoring can help production teams detect failures before they happen, preventing lost production, reducing resource waste and improving operational efficiency.

Using Alfa Laval's condition monitoring solution, the company identified an imminent pump issue that otherwise would have gone

unnoticed until failure occurred. Acting on a single notification, the maintenance team repaired the defect pump during a planned production stop and avoided six hours of unplanned downtime as well as 288,000 bottles of lost product and 2,000 litres of cleaning water.

"Just this one notification paid for our entire investment in the condition monitoring solution", said Chris Heslop, Engineering Specialist at Britvic's Rugby facility.



The value of early warning

At Britvic's Rugby plant, hundreds of pumps support round-the-clock production across multiple beverage lines. Any unexpected pump failure can lead to costly interruptions, loss of product and additional cleaning cycles. Within months of implementation, the condition monitoring system detected abnormal operation on a critical pump and alerted operators before failure occurred. The maintenance team was then able to complete the re-



pair in just 45 minutes within a planned production stop, avoiding six hours of unplanned downtime.

"In today's manufacturing environment, uptime and sustainability are increasingly linked," says Torsten Pedersen, Commercial Head Condition Monitoring, Alfa Laval Fluid Handling. "Our customers are looking for solutions that improve productivity and operational efficiency, and this is exactly where condition monitoring creates value."

Turning machine data into actionable insights

Clariot™ is Alfa Laval's AI-based condition monitoring solution developed specifically for hygienic process industries. The solution continuously monitors pumps and other rotating equipment, providing 24/7 analysis, diagnostics and alerts that enable maintenance teams to address issues in time. Built on Alfa Laval's experience from more than 3,000 condition monitoring installations worldwide, Clariot combines intelligent sensors, advanced AI-based analytics and secure connectivity in a complete monitoring platform that can detect issues related to process conditions, installation issues and mechanical wear.

"We firmly believe that condition monitoring and predictive maintenance is becoming standard practice in modern manufacturing", says Torsten Pedersen. "The value is no longer theoretical, and cases like this clearly demonstrate the positive business impact."

Clariot™ operates independently of business-critical systems. Compatible with most pump brands, the solution can be scaled across production lines, factories and global operations.

This is Alfa Laval

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The Meat Industry in Transition: Efficiency, Shelf Life, and Circularity Define the Way Forward



The meat and processed meat industry is facing growing demands, but also new opportunities. In a stakeholder survey, film manufacturer SÜDPACK identified the key trends and expectations shaping Germany's meat industry. The findings show that companies that can effectively address topics such as shelf life, speed, digitalization, service, and, not least, collaboration between manufacturers, retailers, and suppliers will be well positioned to compete in an increasingly challenging market.

Changing consumer habits, cost and competitive pressures, stringent requirements for product protection and shelf life, and the transition to a circular economy are reshaping Germany's meat and sausage products industry. This is reflected in a SÜDPACK stakeholder survey of market participants. The findings paint a clear picture: Despite challenging market conditions, companies remain broadly optimistic about the future and are focusing their investments firmly on efficiency, automation, and future-ready packaging solutions.

Sustainability matters to the processed meat industry

One point emerges clearly from the survey: Sustainability matters to the industry. On average, companies rate their own targets – often aligned with initiatives such as the SBTi – very highly, as they do relevant certifications (e.g., EcoVadis). Supplier selection, however, is rated somewhat lower. This is notable, as studies show that in the meat industry,

up to 70% of the environmental footprint is generated not at a company's own facilities, but upstream in the supply chain – in areas such as livestock, packaging, ingredients, and logistics – and therefore falls under Scope 3.

At the same time, the PPWR will have a major impact on material choices, recycled content requirements, and reusability. The greatest potential clearly lies in the use of PP- or PET-based mono-materials and in reducing material thickness – without compromising stability, shelf life, or optics.

The findings show that the industry is ready to make further progress on sustainability. The key, however, is not simply to optimize existing packaging, but to develop entirely new, practical packaging concepts – holistic solutions that are technically viable, economically sound, and supported by retailers.

Major investments, especially in digitalization and automation

The food retail trade is a major driver of product ranges, packaging formats, transparency, and sustainability documentation. As a result, manufacturers increasingly need partners that can provide not only high-performance materials, but also data, technical advice, and a sound basis for decision-making. The industry is therefore stepping up investment in the digitalization and automation of its production operations, as well as in digital connectivity such as EDI, enabling companies to work in an integrated way, maintain the

required documentation, and, above all, serve food retailers more efficiently. The emphasis is on modernizing processes that offer the greatest immediate potential to improve efficiency and process stability while reducing costs.

In short, a product alone is no longer enough. Services and support will shape the future – what matters most is the complete package: more information, a stronger factual basis, greater transparency, and more support.

As for market developments ...

The meat and processed meat industry expects consolidation to continue over the next 24 months. Convenience, reliable availability, and the ability to respond quickly are also becoming increasingly important. Portioned, easy-to-prepare products and convenient snack formats are also in demand. Retailers, meanwhile, are increasingly seeking German meat produced to higher animal welfare standards. Costs, staffing, bureaucracy, regulation, and animal welfare requirements are adding further pressure.

Despite these challenges, the industry remains optimistic about the future. Poultry in particular is seeing growing demand, thanks to its availability and versatility. The downward trend in pork also appears to have leveled off, with both poultry and pork seeing a strong trend toward convenience products. Beef, by contrast, has a relatively small convenience segment, as it is traditionally perceived as a more premium product. For beef, the focus is clearly on shelf life. In the sausage segment, companies are increasingly specializing in organic products, regional products, budget ranges, or highly automated production to set themselves apart more clearly, while retailers' own meat processing operations focus on consistent high volumes and efficient processes. According to SÜDPACK's stakeholder survey, these companies have already clearly recognized the importance of PPWR-compliant packaging and are increasingly switching to packaging designed for recycling.

Overall, the picture is mixed: The future of the market will be shaped not by any particular type of meat, but by price, availability, convenience, and shelf life.

Packaging systems and supplier proximity are key

Two systems continue to dominate packaging

concepts: MAP and vacuum packaging. The meat tray remains firmly established as the industry standard. Attempts to switch to flow packs – despite their clear economic and environmental benefits – have met with only limited acceptance. Stand-up pouches, by contrast, are seeing a real surge in popularity, especially for snacks and convenience products, thanks to their practicality, flexibility, and versatility. When it comes to printing technology, the decisive factors are cost, quality, and brand impact.

The majority of companies surveyed consider it essential that their film supplier be based in Germany. Why? Because they value prompt advice, reliable application technology, and a partner that is both dependable and forward-looking.

Broad packaging portfolio for meat and sausages

SÜDPACK offers a wide range of packaging solutions for meat and sausages. The portfolio includes lightweight, PP-based flow packs for ground meat that facilitate recycling; top webs for PP trays that offer high sealing performance, especially when packaging fresh meat; and peelable top webs for APET thermoformed trays, for example for cold cuts. The range also includes flexible PP film concepts for stack packs, as well as PP- or PE-based stand-up pouches for salami sticks and other protein snacks.

SÜDPACK considers the use of PE- and PP-based mono-materials key to advancing the circular economy, since established material loops for both polymers already exist in many EU countries. At the same time, optimizing existing packaging systems remains important. In many cases, reducing film thickness, optimizing pack formats, or incorporating a reclose system can deliver sustainability benefits compared with laminate structures or packaging without a reclose system. The key is to consider material selection and film structure together with sealing performance, mechanical strength, and machinability.

Conclusion: The industry is undergoing profound structural change, but remains optimistic. When it comes to packaging, the future lies in practical, holistic solutions that combine high levels of packaging and process reliability with efficiency, reliable sustainability information, and application-specific advice.

About SÜDPACK

SÜDPACK is a leading manufacturer of high-performance films and packaging solutions for the food, non-food and medical goods industries and also of customer-specific compounds for technically demanding applications.

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How Consumer Expectations have Reshaped India's Packaging Industry over the Last Four Decades



Shailesh Sheth,
Chairman &
Managing Director,
Kris Flexipacks



When people discuss the evolution of packaging, the focus often falls on technology. New materials, advanced printing techniques, innovative formats, and improved manufacturing processes have undoubtedly transformed the industry over the years.

But technology alone does not explain how packaging has changed.

Over the last four decades, some of the most significant shifts in packaging have been driven by consumers themselves. As lifestyles evolved, purchasing habits changed, and expectations became more sophisticated, packaging adapted alongside them.

One of the most visible changes has been the growing demand for information.

There was a time when packaging primarily served the purpose of identifying a product and carrying a brand name. Today, consumers expect considerably more. Ingredient lists, nutritional information, certifications, usage instructions, manufacturing details, and sustainability claims are increasingly influencing purchase decisions. The rise of organised retail and e-commerce has accelerated this trend. In many categories, packaging has become one of the most important sources of product information available to consumers at the point of purchase.

Convenience has emerged as another defining expectation.

Urbanisation, smaller households, changing family structures, and fast-paced lifestyles have influenced how products are consumed and stored. Consumers increasingly look for packaging that is easy to carry, easy to open, easy to reseal, and practical for everyday use. As a result, formats such as stand-up pouches, resealable packs, and portable packaging solutions have become commonplace across multiple categories. Features that were once considered innovative are now often viewed as standard expectations.

At the same time, packaging has taken on a much larger role in brand communication.

Forty years ago, consumers often had fewer

options within a category. Today, they are presented with numerous alternatives competing for attention on the same shelf. In such an environment, packaging frequently becomes the first interaction between a brand and a potential customer. This has led brands to invest more heavily in packaging design, print quality, premium finishes, embellishments, and formats that help products stand out in crowded retail environments. Packaging is no longer expected to simply protect the product. It is increasingly expected to communicate quality, personality, and brand positioning.

Consumer expectations around trust have evolved as well.

Packaging today is expected to reassure consumers about product quality and authenticity. Clear information, secure seals, tamper-evident features, and consistent presentation all contribute to perceptions of reliability. This is particularly important in categories such as food, healthcare, pharmaceuticals, and personal care, where confidence in the product is closely linked to confidence in the packaging.

More recently, sustainability has become a major consideration.

Consumers are paying closer attention to issues such as material usage, recyclability, and environmental impact. While functionality, affordability, and operational requirements continue to remain important, sustainability has become an increasingly influential factor in packaging decisions across industries.

If there is one lesson the industry has learned over the last four decades, it is that consumer expectations rarely remain static. Information, convenience, branding, trust, and sustainability have all become significantly more important over time, and each has influenced the direction in which packaging has evolved. Technology will continue to advance and new packaging solutions will continue to emerge. But as the industry looks ahead, one thing remains clear: packaging may be enabled by innovation, but it will continue to be shaped by the consumer.



Food Enzymes in Bakery: Driving Quality, Efficiency and Innovation

Kanika Banga

functional role. Amylases, for example, act on starch, while xylanases modify arabinoxylans found in wheat flour. Lipases influence lipid components and dough structure, whereas proteases act on gluten proteins and can modify dough extensibility. The choice and dosage of an enzyme depend on the product category, flour characteristics, processing conditions and desired final attributes. Modern enzyme systems may also combine multiple enzymes to achieve several functional benefits within a single formulation.

Improving Dough Handling and Processing

One of the major advantages of enzymes in commercial baking is their ability to improve dough machinability. Industrial bakery operations require dough to move consistently through mixers, dividers, moulders, proofers and ovens. Variations in dough elasticity, extensibility and water absorption can create production challenges. Xylanases, for instance, can modify arabinoxylans and influence water distribution within dough. This can improve dough handling and contribute to better gas retention. Proteases can partially modify gluten proteins, reducing excessive dough elasticity and making certain doughs easier to sheet and process.

For products such as biscuits and crackers, controlled modification of protein structure can be particularly useful because excessive gluten development may negatively affect machinability and finished texture. Enzyme selection therefore provides formulators with another tool to optimise dough behaviour without relying solely on mechanical or chemical adjustments.

Amylases and Bread Freshness

Amylases are among the most established enzymes in bread production. During baking, starch undergoes gelatinisation, while naturally occurring flour enzymes and added enzymes can influence the availability of fermentable sugars and the subsequent structure of the crumb. Alpha-amylase breaks down starch into smaller molecules, providing fermentable substrates that can support yeast activity. Appropriate amylase activity can contribute to improved fermentation, loaf volume and crumb characteristics.

Amylases are also associated with managing bread staling. One of the principal changes

during bread storage is the recrystallisation of starch, particularly amylopectin, which contributes to crumb firming. Specific enzyme systems can interfere with these structural changes and help maintain a softer crumb for longer. This is particularly important for packaged bread, where maintaining acceptable texture throughout the declared shelf life is a major quality requirement. Enzyme systems can therefore support freshness without requiring substantial increases in fat or other traditional softening ingredients.

Xylanases and Dough Structure

Xylanases have gained importance in modern bread formulations because of their interaction with arabinoxylans. These non-starch polysaccharides can influence water absorption, dough viscosity and gas retention. By partially breaking down selected arabinoxylan structures, xylanases can improve the distribution of water within dough and support a more favourable gluten network. The resulting dough may demonstrate improved handling characteristics and gas retention during proofing.

In bread production, this can translate into improved loaf volume, more uniform crumb structure and better processing consistency. However, excessive enzyme activity can have the opposite effect, highlighting the importance of accurate dosing and formulation control.

Enzymes in Cakes, Biscuits and Cookies

The application of enzymes extends well beyond bread. Cakes, biscuits and cookies have different structural requirements, and enzyme systems can be selected according to the desired texture and processing characteristics. In biscuits and cookies, proteases can be used to modify gluten development and improve dough extensibility. This can help reduce shrinkage and facilitate sheeting and cutting. Controlled enzymatic modification may also contribute to desirable texture characteristics in the finished biscuit.

Lipases and other lipid-modifying enzymes can influence dough structure and mouthfeel. In cakes, enzymes can support batter stability and contribute to improved volume and crumb characteristics. Their role becomes particularly relevant when manufacturers reformulate products to reduce certain

The bakery industry has evolved significantly from conventional formulations based primarily on flour, yeast, fats, sugars and chemical leavening agents. Today, bakers are under growing pressure to deliver products with consistent quality, extended freshness, improved nutritional profiles and clean-label positioning, while also managing raw material variability and production costs. Against this backdrop, food enzymes have emerged as important processing aids that can influence dough handling, fermentation, volume, texture, flavour development and shelf life.

Enzymes are naturally occurring proteins that accelerate specific biochemical reactions. In bakery applications, selected enzymes are added in controlled quantities to modify flour components such as starch, proteins, fibres and lipids. Unlike conventional ingredients that remain as functional components in the finished product, many enzymes perform their technological role during processing and are subsequently inactivated by baking. Their specificity allows bakers to target particular processing challenges without substantially altering the basic formulation.

Understanding the Role of Enzymes in Bakery Processing

Flour contains a complex combination of carbohydrates, proteins, lipids, minerals and other compounds that interact throughout mixing, fermentation and baking. The performance of these components can vary depending on wheat variety, growing conditions, milling practices and storage. Enzymes provide a means of managing some of this variability by selectively modifying specific flour constituents.

The most commonly used bakery enzymes include amylases, xylanases, lipases, proteases, glucose oxidase and cellulases. Each enzyme has a different substrate and

conventional ingredients or respond to changing consumer preferences.

Enzymes and Whole-Grain Bakery Products

The increasing demand for whole-grain and high-fibre bakery products has created additional formulation challenges. Whole-grain flours contain higher levels of fibre and other components that can interfere with gluten development, water distribution and loaf volume. Enzyme technology can help address some of these challenges. Xylanases and other carbohydrate-active enzymes can modify fibre-related components and improve dough performance. Certain enzyme combinations may support better volume and softer crumb characteristics in whole-grain breads. This becomes increasingly important as consumers seek products with higher fibre content while still expecting the softness, taste and convenience associated with conventional bakery products.

Supporting Clean-Label and Reformulation Strategies

Clean-label trends are also influencing the development of bakery formulations. Consumers increasingly look for recognisable ingredients and products perceived as simpler or more natural. This has encouraged manufacturers to reconsider the use of certain traditional processing aids and additives.

Enzymes can contribute to reformulation strategies because they work through highly specific biochemical reactions. Depending on regulatory requirements and the enzyme preparation used, they can perform technological functions during processing while offering an alternative approach to achieving particular product characteristics. However, clean-label positioning should not be treated as a universal claim for enzyme-containing products. Regulatory definitions and labelling requirements vary between markets, and manufacturers need to assess the status and declaration requirements of each enzyme preparation according to the applicable legislation.

Managing Flour Variability

One of the less visible but important applications of enzymes is their role in managing raw material variability. Wheat flour is a biological material, and its functional characteristics can change from one crop year, region or supplier to another. Such variation can affect water absorption, dough strength, fermentation performance and finished-product quality. Enzyme systems can help compensate for some of these variations by providing more controlled functionality during processing.

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For large-scale bakeries producing millions of units, even small variations in dough performance can result in significant changes in production efficiency and product consistency. Enzyme-based process control can therefore form part of a broader quality-management strategy.

Precision Formulation and Enzyme Selection

The effectiveness of an enzyme depends heavily on dosage and processing conditions. Factors such as pH, temperature, water availability, flour composition, mixing intensity, fermentation time and baking conditions can influence enzymatic activity. For this reason, enzyme selection should not be considered independently from the overall recipe and process. A solution that works effectively in one bakery may not deliver the same result in another facility operating with different flour, equipment or process parameters. Modern bakery development increasingly relies on controlled trials and analytical testing to determine the optimum enzyme combination. Parameters such as dough rheology, loaf volume, crumb firmness, texture, colour and shelf-life performance can be measured to evaluate the impact of an enzyme system.

The Future of Enzyme Technology in Baking

The future development of bakery enzymes

is likely to be closely linked to the industry's wider priorities, including sustainability, nutrition, process efficiency, food waste reduction and product reformulation. Enzymes can help manufacturers optimise processing and potentially extend product freshness, thereby supporting efforts to reduce waste. Advances in biotechnology are also enabling the development of increasingly targeted enzyme solutions. Greater understanding of flour chemistry and enzyme-substrate interactions is allowing formulators to design systems for specific applications rather than relying on broad functionality.

There is also growing interest in enzymes that can support high-protein, high-fibre, reduced-sugar and alternative-grain bakery products. As consumer expectations continue to evolve, the ability to modify specific functional characteristics without significantly changing the sensory profile will become increasingly valuable.

A Strategic Tool for Modern Bakeries

Food enzymes have moved beyond being specialised processing aids to become an important component of modern bakery technology. From improving dough handling and loaf volume to maintaining crumb softness and addressing whole-grain formulation challenges, enzymes offer manufacturers a precise way to influence multiple stages of production. Their value, however, lies not simply in adding an enzyme to a recipe but in understanding the interaction between the enzyme, raw materials and processing conditions. Correct selection, dosage and process control are essential to achieving consistent results.

As the bakery sector moves towards more efficient production, longer freshness, improved nutrition and cleaner formulations, enzyme technology is expected to remain an important area of innovation. For industrial bakers, enzymes provide a versatile toolbox for fine-tuning product quality while responding to increasingly complex technical and consumer requirements.



Smart Food: For Balanced Future

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1. Introduction: The Changing Face of Food

Food is no longer perceived only as a provider of energy to quench the pangs of hunger. Consumers are becoming increasingly health oriented and expect foods that will enhance overall wellness, immunity, and prevent the onset of any lifestyle diseases such as obesity, diabetes, and heart ailments. Hence, the shift in focus is no longer confined to providing basic nutrients but is now extending towards foods that provide health benefits and help live a healthy lifestyle.

Moreover, with growing concerns related to environmental sustainability and food security, there is an increasing need for those foods that provide good nutrition, are economically feasible for farmers, and are sustainable in terms of usage of natural resources. It is resulting in the development of what is known as 'smart foods'—foods which not only contribute to health of individuals but also to sustainable food systems. These include millets, legumes, probiotics, and functional foods among others.

2. What Are Smart Foods?

Foods that provide more benefits than just being nutritive by providing good health, sustainable farming, and securing the food chain. Smart foods are those foods that benefit people from aspects other than basic nutrition. The idea of smart foods includes the

Foods that provide more benefits than just being nutritive by providing good health, sustainable farming, and securing the food chain. Smart foods are those foods that benefit people from aspects other than basic nutrition. The idea of smart foods includes the aspect of holistic approach to food systems, as food is nutritious, as well as sustainable and affordable to people. These foods are rich in nutrients and at the same time they are climate proof. The important characteristics of smart foods include nutritional value, healthiness, cost efficiency and least impact on the environment. They have many components which contribute to better health including dietary fibers, vitamins, minerals, antioxidants, probiotics and other bioactive components.

aspect of holistic approach to food systems, as food is nutritious, as well as sustainable and affordable to people. These foods are rich in nutrients and at the same time they are climate proof. The important characteristics of smart foods include nutritional value, healthiness, cost efficiency and least impact on the environment. They have many components which contribute to better health including dietary fibers, vitamins, minerals, antioxidants, probiotics and other bioactive components. Examples of smart foods include: Millets which are Nutritional as well as climate proof food crops, Probiotic

yogurt for Maintaining digestive health; fortified foods for high vitamins and minerals; whole grains for high fibre.

3. COMPONENTS OF SMART FOOD

a) Functional Foods

- Functional foods are those which have additional health benefits apart from being nutritious.
- They consist of various elements such as probiotics, prebiotics, antioxidants, dietary fiber, vitamins, minerals, omega-3 fatty acids, etc.
- These foods can help in promoting various aspects of good health like digestive system health, immune system health, heart health, and metabolic health, among others.
- For example, probiotic yogurt promotes digestive health, fortified milk helps in increasing the intake of various micronutrients, omega-3 eggs promote good fats, and whole grains promote dietary fiber intake.

b) Smart Proteins

- Smart proteins are those protein sources that are able to provide high-quality nutrition while having the possibility of decreasing the demand for land, water, and other natural resources.
- The examples of smart proteins are plant proteins from legumes, pulses, cereals, oilseeds, fermentation-produced proteins, and new alternatives to protein sources.
- Biotechnology can be applied for production of specific proteins and functional ingredients using technology of precision fermentation.
- Smart proteins may help to achieve food and nutrition security due to diversification of protein sources and increasing of protein demand worldwide.
- Within dairy industry, whey proteins are also smart proteins that can be used to obtain nutritionally valuable drinks and functional foods.

c) Personalized Nutrition

Personalized nutrition is defined as the creation of a diet that is designed specifically with respect to age, lifestyle, nutritional needs, health status, dietary preference, and other pertinent factors. Rather than giving the same kind of diet to all, personalized

nutrition would be able to provide more individual-oriented food options. Artificial Intelligence (AI), wearables, mobile apps, and digital technologies could be useful in gathering dietary data of individuals. AI could help recognize dietary patterns and make recommendations for appropriate foods or meals based on the needs of individuals. Personalized nutrition in the future may become an integral part of smart foods, which would allow designing foods not only for everyone but also for particular needs of individuals.

3. How Smart Foods Improve Health

- **Gut Health:** Healthy gut bacteria through the use of smart foods like probiotic and prebiotic foods ensures good digestion, better nutrient absorption, and proper immune functions.
- **Immunity Boost:** Most of the smart foods contain many vitamins, minerals, antioxidants, and microorganisms which help to boost the immune system of the body.
- **Weight Management:** Foods which are high in fiber content and protein can keep you full for a longer time and hence helps to prevent obesity and maintain healthy body weight.
- **Diabetes Prevention:** Millets, whole grains, and legumes among others prevent diabetes because of their low glycemic index property.
- **Cardiovascular Protection:** Use of smart foods with healthy fat, dietary fiber, and antioxidant can protect the heart by controlling your cholesterol levels.
- **Bioactive Compounds and Essential Nutrients:** They provide essential nutrients including proteins, vitamins, minerals, dietary fibers, probiotics, and antioxidants among others.
- **Lifestyle Disease Prevention:** Consumption of smart foods can prevent lifestyle disease including obesity, diabetes, hypertension, and others.

4. Role of Technology in Smart Foods Artificial Intelligence and Personalized Nutrition:

Artificial intelligence (AI) is now becoming increasingly common when it comes to the analysis of an individual's dietary patterns, lifestyle, health data, and nutrient requirements. Based on these parameters, AI-driven technology can recommend personalized food choices and diet. In the future, such technology could enable consumers to choose the food based on

their personal requirements, not following a one size fits all strategy.

• Biotechnology and Precision Fermentation:

With the help of biotechnology, new ways of manufacturing nutrients and functional food ingredients can be explored. Precision fermentation involves using microorganisms to manufacture specific proteins, enzymes, vitamins, and other ingredients. In the dairy industry, there is potential in manufacturing dairy proteins like whey and casein without traditional animal farming.

• Smart Packaging and Digital Food Monitoring:

The process of smart packaging involves the use of such tools as sensors, indicators, QR codes, and other digital systems that will be able to monitor food quality, safety, freshness, and temperature. Such technologies can offer consumers and food producers information regarding the condition of food during the whole chain.

5. Smart Foods in the Dairy and Food Industry

• Functionality in Dairy Products:

Dairy producers are continuously producing foods that serve purposes other than nutritional purposes. These functional dairy foods include probiotic yogurt, fermented milk, fortified milk, and probiotic dairy drinks. The probiotic products contain useful microorganisms while fortified milk contains added nutrient components such as calcium, vitamin D, iron, or any other micronutrient.

• High Protein and Whey-Based Health Foods:

The growing consciousness about the significance of protein content has been raising demands for the production of foods with high protein levels. Whey proteins are especially valuable as they contain all the necessary amino acids and also possess good digestibility levels. This can be utilized for developing protein-containing beverages, sports nutrition products, and protein bars or other functional foods. This way, whey can be converted from a by-product of dairy to a useful nutritional product.

• Innovations of the Dairy & Food Industry Related to Consumers' Health Needs:

Foods and dairy producers are currently creating foods according to the requirements of the consumers such as low sugar, high protein, probiotic, prebiotic, fortified, and clean label foods. The advances in processing techniques, membrane filtration, fermentation, encapsulation, and biotechnology are being used for this purpose.



6. Future Prospects and Conclusion

• Smart Foods for Improved Nutrition and Food Security:

Problems related to poor nutrition and lifestyle diseases can be tackled with the help of smart foods. High-nutrition foods such as millets, legumes, fortified foods, and functional dairy foods are able to provide consumers with the necessary nutrients and contribute to improved health. On the other hand, the cultivation of crops that are resilient to changes in climate may ensure food security due to rapid population growth and climatic changes.

• Contribution to Sustainability of the Food System:

The production of smart foods may contribute to sustainability through promotion of local, high-nutrition, and climate-resistant ingredients. Technologies such as precision fermentation, food processing, by-product utilization, and sustainable packaging may help reduce food waste and increase resource efficiency. As far as the dairy industry is concerned, one should note that conversion of whey into nutritious and functional food ingredients is a good example of the latter approach.

• What Does the Future of Food Look Like?

The future food system is expected to become increasingly interconnected with nutrition, technology, health, and sustainability. The consumer of tomorrow will want to have tasty and convenient, but also healthy and sustainable products. Improvements in AI, biotechnology, food processing, and personalized nutrition will further expand the possibilities of smart foods.

Conclusion

Smart foods provide a transition from "foods for survival" to "foods for health and sustainability." Smart foods, through their nutritious qualities, health-giving nature, technological advancement, affordability, and environmentally sound nature, may play an important role in achieving better people and more sustainable food systems. Future of food, therefore, should not only be about producing more food but also about producing smarter food.

Farm to Fork: Building Consumer Trust Through Food Traceability



Dr. G. Pandidurai

Dr. P. M. Brindhavani

Introduction

Food safety is a critical issue that affects everyone. Ensuring the safety and quality of food products is vital for protecting consumers' health, preventing foodborne illnesses, and maintaining trust in the food supply chain. One essential aspect of food safety is traceability, which refers to the ability to track and trace food products throughout the entire supply chain, from farm to table. Traceability systems enable the identification and recall of unsafe or contaminated products, making it easier to respond quickly to food safety incidents.

In recent years, there has been growing awareness of the importance of traceability in the food industry. Consumers are becoming more concerned about the safety and origins of their food, and governments are implementing stricter regulations to ensure the traceability of food products. In this article, we will explore how food tracing works, why food traceability systems are important, the challenges with implementing traceability in food supply chains, and how to choose the best food traceability system for your needs. By the end of this article, you will have a better understanding of the critical role that traceability plays in ensuring the safety and quality of our food supply.

What is food traceability?

Food traceability is the ability to track a food product and its ingredients throughout the supply chain. It involves recording and managing information generated at every stage, from production and processing through distribution.

Among all forms of product traceability, food requires particularly rigorous oversight because of its direct impact on consumer health. According to the World Health Organization (WHO), 1 in 10 people becomes ill each year after consuming contaminated food. Food traceability helps prevent these situations by enabling regulatory authorities and businesses to respond quickly to incidents, pinpoint the source of the problem, limit its impact and remove affected products from the market.

International bodies such as the Food and Agriculture Organization of the United Nations (FAO) and the WHO have promoted common frameworks for food safety. One example is the Codex Alimentarius, which establishes globally recognised principles designed to protect consumers and encourage best practices in food trade. As a result, food traceability is now a requirement in most major international markets.

Types of food traceability

Understanding the different types of traceability in the food industry helps businesses enhance visibility across the supply chain and take quick action when issues arise. Depending on the stage being monitored, food traceability falls into three categories:

Backward traceability (upstream)

This phase identifies the origin of a food

product and its ingredients. Its purpose is to determine where each item comes from, along with all relevant information about its sourcing, condition and receipt. To accomplish this, companies record details such as the supplier, geographic origin, purchasing information, lot number, food type and receipt date. This level of traceability also captures the product's initial processing history.

Internal traceability (process traceability)

This stage covers what takes place within a company's facility, from receiving raw materials to producing the finished good. It documents any changes food undergoes, such as being portioned, blended or otherwise transformed. When correctly implemented, internal traceability provides greater visibility into production. It helps detect risks such as cross contamination and improves inventory accuracy.

Forward traceability (downstream)

This category focuses on a product's journey after its dispatch from the facility. It makes it possible to pinpoint which customers or destinations received each shipment, whether distributors, retailers or food service businesses. To support this process, companies maintain records on the shipped product, recipient, shipping date, lot number, previous warehouse location and transport conditions. This level of control is particularly valuable when managing food and beverage recalls efficiently.

Why Are Food Traceability Systems Important?

Food traceability systems are important for several reasons, including protecting public health, ensuring compliance with regulations, and improving supply chain efficiency. In this section, we will explore some of the key reasons why food traceability systems are essential for the food industry.

Protecting Public Health

The primary goal of food traceability systems is to protect public health by ensuring the safety and quality of food products. Foodborne illnesses can have serious health consequences, ranging from mild symptoms such as nausea and vomiting to more severe symptoms such as kidney failure and death. In addition, foodborne illnesses can have significant economic consequences, including the cost of medical treatment and lost productivity.

Food traceability systems can help to prevent foodborne illnesses by enabling the rapid identification and recall of contaminated or unsafe food products. By tracking the movement of food products throughout the supply chain, food traceability systems can identify the source of a foodborne illness outbreak and enable the removal of contaminated products from the market. This can help to prevent the spread of the illness and protect public health.

Ensuring Compliance with Regulations

In addition to protecting public health, food traceability systems are important for ensuring compliance with regulations. Many countries have strict regulations governing the production, processing, and distribution of food products. These regulations are designed to ensure the safety and quality of food products and protect public health.

Food traceability systems can help companies to comply with these regulations by enabling the tracking and monitoring of food products throughout the supply chain. By documenting each step in the supply chain and storing the data in a centralized database, companies can demonstrate compliance with regulations and provide proof of product origin and quality.

Improving Supply Chain Efficiency

Food traceability systems can also help to improve supply chain efficiency by identifying inefficiencies and bottlenecks in the supply chain. By tracking the movement of food products, supply chain managers can identify areas where the supply chain can be improved, such as reducing transportation times or improving storage conditions. This can help to reduce costs and improve delivery times, benefiting both companies and consumers.

Enhancing Consumer Trust

Finally, food traceability systems can help to enhance consumer trust in the food industry. Consumers are becoming increasingly concerned about the safety and quality of their food products, and they are demanding more transparency and information about the products they consume. By implementing robust food traceability systems, companies can demonstrate their commitment to food safety and quality, and provide consumers with the information they need to make informed purchasing decisions.

In addition, food traceability systems can help to improve the traceability and authenticity of food products. This is particularly important in industries such as seafood and meat, where mislabeling and fraud are common. By tracking the movement of food



Fig. 1

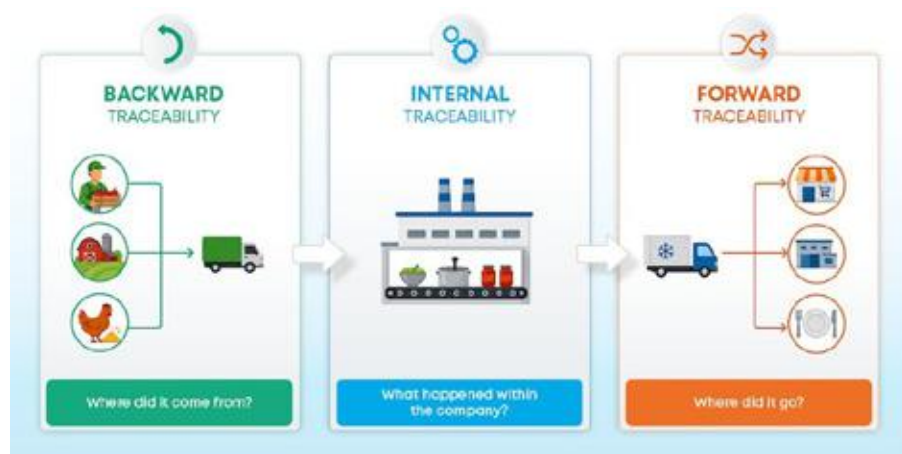


Fig. 2

products throughout the supply chain, food traceability systems can help to prevent fraud and ensure that consumers are getting the products they pay for.

Overall, food traceability systems are essential for the food industry. By enabling the tracking and monitoring of food products throughout the supply chain, food traceability systems can protect public health, ensure compliance with regulations, improve supply chain efficiency, and enhance consumer trust.

Future Trends

The future of food traceability is full of potential, driven by technological advancements and growing customer expectations. Emerging trends aim to redefine the industry, making traceability more robust and efficient. Integration of the IoT, Artificial Intelligence (AI) and Machine Learning (ML) Algorithms, Blockchain Technology and Satellite Imagery.

Conclusion

Overall, while food traceability systems offer significant benefits to the food industry, there are several challenges that must be addressed to ensure their effective implementation. These challenges include the complexity of supply chains, lack of standardization, limited technology and resources, data privacy and security concerns, and resistance to change. By addressing these challenges, the food industry can improve supply chain transparency, protect public health, and enhance consumer trust in the food products they consume.

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GNT secures independent verification of Product Carbon Footprint methodology for plant-based EXBERRY® colors



GNT has become one of the first food color manufacturers worldwide to have its Product Carbon Footprint (PCF) methodology independently verified in line with the ISO standard. The PCF calculations account for the total greenhouse gas emissions produced across the entire lifecycle of each EXBERRY® coloring ingredient, including agriculture, energy use during production, and transportation. The figures therefore give food and beverage brands access to measurable, credible information for their own sustainability reporting, decision-making, and marketing materials.

GNT creates EXBERRY® colors from non-GMO fruits, vegetables, and plants. Due to its closely managed supply chain, the company already has a corporate carbon footprint verification in line with the GHG Protocol that covers every stage of color production (scopes 1 to 3).

TÜV SÜD, a leading global supplier of testing and certification services, has now confirmed that the cradle-to-gate methodology GNT uses to calculate EXBERRY® PCF figures aligns with the requirements of ISO 14067.

Petra Thiele, Managing Director at GNT Group, said: "GNT is committed to the highest sustainability standards, and transparency and trust are a vital part of that. This important milestone now ensures our customers can rely on carbon footprint data that has been independently verified against the ISO standard." GNT currently holds an EcoVadis Platinum award for its sustainability performance, ranking it among the top 1% of companies in the food manufacturing industry.

GNT's Senior Sustainability Specialist, Akshat Rawat, said: "We've made it our mission to produce plant-based ingredients that drive a healthier future for people and planet. We work closely with our customers on their decarbonization journeys, and our verified PCF data gives them the information they need to maximize product sustainability."

For more information about EXBERRY®, visit: www.exberry.com

About EXBERRY®

EXBERRY® is a leading global brand of plant-based, sustainable colors for food and drink. The EXBERRY® portfolio includes a complete spectrum of shades created from non-GMO fruit, vegetables, and plants. They are available in a wide range of formats and suitable for almost any application, including confectionery, dairy, bakery, soft and alcoholic beverages, cereals, snacks, sauces, savory, and plant-based meat, seafood, and dairy. EXBERRY® colors are trusted by many of the world's leading food and beverage manufacturers for their vibrancy, versatility, stability, ease of use, and strong sustainability credentials.

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Ball Announces Investment in New Manufacturing Facility in Uttar Pradesh, India



Ball Corporation, a global leader in sustainable aluminum packaging solutions, today announced plans to further expand its manufacturing footprint in India with a new beverage can manufacturing facility in Uttar Pradesh. With two established facilities in India located in Taloja, Maharashtra, and Sri City, Andhra Pradesh, Ball will now invest in a new two-line beverage can manufacturing facility in Uttar Pradesh, expected to be operational in 2029.

As demand for sustainable aluminum packaging grows across India, Ball remains committed to investing alongside its customers. Recent investments in Taloja and Sri City have strengthened Ball's presence

in the market, and the new greenfield investment in Uttar Pradesh is the next step in Ball's commitment to the growing Indian market. The project is expected to generate strong EVA, is supported by customer contracts and is consistent with Ball's guidance that capital expenditures will average depreciation and amortization over time.

"Our vision is to build a plant network in India that supports our customers and reaches the majority of states across India," said Mandy Glew, senior vice president and president, Europe, Middle East, Africa and Asia. "India continues to be one of Ball's most important strategic growth markets, and this investment reflects our confidence in the country's long-term economic potential and the continued growth of aluminum packaging."

Since entering the Indian market in 2016, Ball has steadily expanded its footprint across India through its presence in Taloja and Sri City, providing a wide range of beverage can formats that serve both global and leading domestic brands.

bovine breeds, improved cattle housing, farm mechanisation, nutrition and herd health. The initiative also seeks to leverage government subsidy schemes, including the Mukhyamantri Krushi Udyog Yojana (MKUY), to help participating farmers access more affordable capital for strengthening and expanding their dairy operations. With dairy farming serving as an important source of livelihood for rural households, the initiative is designed to address key requirements for sustainable dairy development, including access to finance, scientific farm management and productivity enhancement.

Commenting on the launch, Mr. R. G. Chandramogan, Chairman, Hatsun Agro Product Ltd., said: "At Hatsun Agro Product Ltd., we have played a significant role in the development of the dairy sector and animal husbandry across South India for decades. Our journey has always been guided by the belief that the prosperity of dairy farmers is the foundation of a strong and sustainable dairy industry."

"Through the Go-Dhan initiative, we aim to support the establishment of more than 6,000 dairy farms, over the next three years in a phased manner. This initiative is designed to improve farmer incomes, encourage scientific dairy farming, and create a sustainable dairy ecosystem in Odisha."

Hatsun Agro Product Ltd. Partners with Government Of Odisha and State Bank Of India to Launch 'Go-Dhan' to Empower Dairy Farmers



Hatsun Agro Product Ltd. (HAPL), the largest private sector Dairy in India, has launched 'Go-Dhan', a flagship initiative aimed at empowering dairy farmers across Odisha by improving access to financial support, government schemes, modern dairy practices and technology.

The initiative was formally launched at a ceremony held at the OUAT Auditorium, Bhubaneswar, in the presence of distinguished representatives from the Government of Odisha, banking and the dairy sector, including Sri Prem Chand Chaudhary, Secretary, Department of Fisheries & Animal Resources Development, Government of Odisha, as Chief Guest; Sri Shubhranshu, Managing Director, APICOL, as Guest of Honour; Sri Rakesh Kumar Yadav, Chief General Manager, State Bank of India; and Mr. R. G. Chandramogan, Chairman, Hatsun Agro Product Ltd. The gathering brought together key stakeholders from across the dairy, financial and government sectors, reflecting a shared commitment to strengthening farmer livelihoods and supporting the continued growth of Odisha's dairy economy.

Go-Dhan is expected to benefit 6000 dairy farmers across 15 districts of Odisha, providing them with greater access to institutional finance and relevant government support to invest in areas such as quality

"We are deeply grateful to our partners in this journey—the dairy farmers of Odisha, the Department of Animal Husbandry, Government of Odisha, APICOL and the State Bank of India. Their support and collaboration have made this initiative possible. Together, we are committed to transforming Odisha into a dairy-rich state while creating better opportunities, higher incomes, and long-term prosperity for its farming community."

"Hatsun Agro's focus has always been on dairy farming, a key component of secondary agriculture. Strengthening dairy farming creates a positive impact on primary agriculture by providing farmers with a stable and progressive source of income. Through this initiative, we envision building a strong dairy value chain in Odisha, unlocking the state's agricultural potential while creating long-term prosperity for its farming community. Our objective is to produce and procure milk within Odisha, creating value for local farmers while meeting consumer demand not only in Odisha but also for export to the neighbouring markets such as West Bengal, North Andhra Pradesh, and other nearby states. This initiative will strengthen the regional dairy economy and create sustainable growth opportunities for everyone involved."

Schreiber wFoods Expands Process-Cheese Network with \$267 Million Investment in Missouri

Schreiber Foods will invest more than \$267 million to build a new process-cheese manufacturing facility in Carthage, Missouri, expanding its production capacity to meet growing customer demand. The state-of-the-art facility is expected to begin operations in 2028 and create approximately 100 new jobs. The investment will strengthen Schreiber's manufacturing capabilities and support its focus on food quality, food safety, service and supply reliability. Trevor Farrell, President of Schreiber Foods, said the investment reflects the company's approach to expanding its network in line with customer growth and future demand.

The project also reinforces Schreiber's long-term commitment to the process-cheese category. Jason Stephens, Executive Vice President and President, US, said the company continues to see opportunities in the category and is investing in the people, technology and manufacturing capabilities required to support its customers. Schreiber has been part of the Carthage community for more than 75 years, having established operations there



in 1950, and currently employs more than 1,300 people across its existing facilities. Local officials said the expansion is expected to support employment and economic activity in the region, while also increasing demand for housing and related community infrastructure.

The Carthage facility is part of Schreiber Foods' broader global cheese-manufacturing expansion strategy. The company is continuing to invest in and expand operations across international markets to build a more resilient, flexible and connected manufacturing network capable of serving customers across continents. The new facility will therefore add capacity in the US while contributing to Schreiber's wider growth strategy in the global process-cheese market.

Brenntag opens new Nutrition Innovation & Application Center in Jakarta



Brenntag, the global market leader in chemicals and ingredients distribution, today announced the opening of its new Innovation & Application Center for Nutrition in Jakarta, Indonesia. The center supports food and beverage manufacturers in Indonesia and Southeast Asia with localized technical expertise, application development and product innovation capabilities.

Located at The Gallery CIBIS Park in Jakarta, the Innovation & Application Center offers formulation development, application testing, laboratory analysis, pilot production, and technical training for food and beverage manufacturers. Equipped with a UHT pilot plant, it enables customers and supplier partners to validate and refine new product concepts before commercialization. As part of

Brenntag's network of 31 Nutrition Innovation & Application Centers worldwide, the facility combines local application expertise with access to global technical knowledge.

Kenneth Keh, Brenntag Regional President, Nutrition, Asia Pacific, said, "Indonesia is one of the most dynamic food and beverage markets in Southeast Asia and a strategically important market for Brenntag. This investment strengthens our ability to support customers with the technical expertise and market insights needed to develop differentiated products, respond to evolving market trends, and capitalize on growth opportunities across the region."

Supported by a dedicated team of technical and application specialists, the center serves customers across a broad range of nutrition segments, including alcoholic and non-alcoholic beverages, bakery, confectionery, convenience food, dairy, meat, poultry and fish processing, nutraceuticals, sauces and condiments, specialized nutrition, and plant-based products. Winnie Koh, Brenntag Innovation & Application Director, Nutrition, Asia Pacific, said, "The center strengthens our ability to translate technical expertise into practical product solutions. Customers can engage directly with our application specialists to evaluate formulations, optimize performance, and validate concepts through pilot trials before commercial production."

dsm-firmenich partners with Boltz on AI for ingredient discovery

dsm-firmenich

dsm-firmenich has entered into a new partnership with Boltz PBC, a startup founded by former MIT scientists specialising in AI models for biomolecular modelling. The collaboration will integrate Boltz's proprietary foundation models into dsm-firmenich's ingredient-discovery processes to accelerate the development of new scent and flavor molecules. By combining Boltz's AI capabilities with dsm-firmenich's extensive library of taste and odor receptor data, the partnership will develop exclusive models designed to predict and design molecular structures and analyse how molecules interact with receptors involved in the perception of taste and smell.

Under the partnership, dsm-firmenich scientists will have access to the Boltz platform, including the Boltz Lab interface, API and a new integration with large language model agents that enables scientists to orchestrate complex design and prediction workflows using natural language. Embedded Boltz researchers will also work alongside dsm-firmenich teams to apply the models to sensory science. The companies said the technology will enable perfumers, flavorists and scientists to explore a wider range of molecular possibilities, identify promising compounds and accelerate experimentation and product development.

Sarah Reisinger, Chief Science & Research Officer at dsm-firmenich, said the company has been using AI in ingredient innovation since launching what it described as the world's first AI-created flavor in 2020. Gabriele Corso, Co-founder and CEO of Boltz, said the partnership will apply biomolecular interaction and design models to odor and taste receptors, combining Boltz's AI models with dsm-firmenich's sensory-science expertise.

BL Agro Announces Investment of ₹1,500 Crore in its Biotech-Arm Leads Genetics to Build an Integrated Dairy and Genetics Ecosystem



BL Agro has announced an investment of ₹1,500 crore in its biotechnology subsidiary, Leads Genetics, to develop an integrated dairy and genetics ecosystem aimed at improving cattle breeding and dairy productivity in India. Announced at the two-day Cattle Genomics Summit 2026 in Bareilly, the initiative will bring together breed improvement farms, in-vitro fertilisation and embryo transfer facilities, multiple ovulation and embryo transfer (MOET), pathology laboratories and genomics laboratories. The company is also in discussions with Uttar Pradesh, Maharashtra, Bihar and Madhya Pradesh to replicate the model in other states. The initiative forms part of BL Agro's 360-degree milk value chain strategy, covering genetics, breeding, animal health, nutrition, milk production, processing and market linkages, supported by farmer outreach programmes.

At the summit, Leads Genetics showcased genomic testing, advanced sequencing and reproductive technologies, including a Zebu-optimised bovine single nucleotide polymorphism (SNP) chip and a live demonstration of next-generation sequencing using the Illumina NovaSeq X platform.

The genomic chip analyses thousands of genetic markers to support early selection of cattle based on traits such as milk yield, fertility, growth, health, heat tolerance and resistance to ticks and parasites. Combined with IVF, embryo transfer and sex-sorted semen, these technologies aim to accelerate genetic improvement and strengthen domestic production of elite bulls, embryos and semen while supporting indigenous breeds adapted to Indian climatic conditions. The developments also build on the India-Brazil cattle-genetics partnership formalised through an agreement in Brasília.

BL Agro Chairman Dr Ghanshyam Khandelwal said the investment will support scientific dairy practices, improve cattle productivity and reproductive performance, and create income and employment opportunities for farmers and rural youth. Leads Genetics is targeting production of 15,000 embryos per month by the end of 2027. The company also reported the live birth of genetically selected elite Gir calves as part of its indigenous breeding programme. The summit brought together scientists, breeders, researchers and industry stakeholders, with participation from Madhya Pradesh Deputy Chief Minister Rajendra Shukla, Uttar Pradesh Animal Husbandry Minister Dharampal Singh and Uttar Pradesh Minister of State Arun Kumar Saxena. The initiative aims to strengthen India's domestic genetic capabilities, reduce reliance on imported high-end germplasm and improve the productivity and resilience of the country's dairy sector.

Ecovado and Alfa Laval Launch Avocado Oil Plant to Drive Economic Growth in South Africa



Ecovado, a South African agro-processing company founded by entrepreneur Hulisani Mudau, has commissioned a new avocado oil processing plant in Limpopo's Vhembe District in partnership with Alfa Laval Middle East, South and East Africa.

The fully operational facility uses a 100% Alfa Laval processing line to convert locally grown avocados into avocado oil, with most production targeted at export markets. The plant employs local residents and sources fruit directly from small-scale growers, creating opportunities for local employment, agricultural income and value addition. As part of the partnership, Alfa Laval also provided funding for avocado seedlings for small-scale farmers in surrounding communities. The initiative is intended to expand local avocado cultivation, strengthen the plant's long-term raw-material supply and create additional income opportunities for farming households. Ecovado plans to expand its network of community suppliers and increase export volumes as production grows, with the broader objective of developing the Vhembe region into a competitive participant in the global avocado oil market.

Westfalia Fruit brings new ripeness guidance to avocado shoppers in India



Westfalia Fruit has introduced its Ripe-O-Meter ripeness indicator technology across retail stores in five major Indian cities to help consumers select avocados based on when they plan to eat them. Shoppers can place an avocado on the unit to determine whether it is ready to eat or requires more time to ripen. The initiative addresses one of the key challenges for Indian consumers who are still becoming familiar with avocados and aims to increase confidence at the point of purchase.

The technology is being introduced alongside Westfalia Fruit's existing ripening programmes, packaging and in-store consumer education initiatives. By providing a clear indication of ripeness, the Ripe-O-Meter can also reduce the need for shoppers to squeeze fruit to assess its condition, helping minimise bruising and unnecessary product damage. The company said the approach can support better fruit quality and potentially reduce waste at both retail stores and homes.

Westfalia Fruit supplies the Indian market largely from African origins and is investing in supply, ripening, distribution and category development across retail, foodservice and e-commerce channels. The company said the initiative forms part of its efforts to make avocados more accessible and easier to enjoy while helping retail partners address consumer barriers and build repeat demand for the category.

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Barry Callebaut launches first low carbon dairy partnership with Arla Foods



Barry Callebaut, the world's leading manufacturer of high-quality chocolate and cocoa solutions, today announced the launch of its first dairy partnership to reduce impact on climate emissions with Arla Foods, through the FarmAhead™ Customer Partnership program. This three-year collaboration marks an important step in the decarbonization of Barry Callebaut's dairy supply chain, starting with skimmed milk powder sourced from the UK.

Through this partnership, Arla will provide annual primary carbon footprint data linked to the dairy volumes supplied to Barry Callebaut at farm level. This will support the company's Scope 3 emissions reduction journey and accelerate the roll-out of decarbonization initiatives on dairy farms in the shared supply

chain. The collaboration marks an important milestone in advancing Barry Callebaut's Net Zero roadmap and reinforces its efforts to develop scalable low-carbon dairy solutions with strategic suppliers. It also contributes to Barry Callebaut's broader Net Zero Chocolate Solutions, which enable customers to reduce the end-to-end footprint of their cocoa and chocolate products through targeted partnerships.

"Decarbonizing dairy is essential to reducing our carbon footprint, and this partnership is a testament to our commitment to driving meaningful progress on our Net Zero journey. By working closely with partners like Arla, we can increase transparency in our dairy supply chain and accelerate the development of scalable decarbonization initiatives that support our Scope 3 reduction targets and contribute to ongoing sustainability efforts in the food chain," commented Tilmann Silber, Head of Net Zero at Barry Callebaut.

This partnership represents the interconnectedness of sustainability and sourcing working together at Barry Callebaut. The partnership demonstrates that decarbonization is not only about carbon data, but about building long-term partnerships capable of driving change at farm level.

"Dairy is one of the most complex categories to reduce carbon footprint and meaningful progress requires close collaboration across the entire value chain. What makes this initiative particularly important is the ability to connect climate ambition with concrete action

at farm level through long-term engagement with suppliers and farmers. This collaboration with Arla represents an important step in developing credible and measurable lower-carbon dairy sourcing solutions for the future," commented Gabriela Aramayo, Responsible Sourcing Lead Dairy at Barry Callebaut.

Cathrine Konge Varming, Senior Director Sustainability Innovation & Development at Arla, commented "We are pleased to work closely together with Barry Callebaut on our shared goal to reduce emissions from dairy. Through the partnership, we can further support the actions our farmer owners are taking to produce high-quality dairy as efficiently as possible while providing valuable data for Barry Callebaut's reporting purposes. It is a clear example of two ambitious companies living up to their responsibility and recognising the importance of collaboration."

Key principles of the partnership include primary farm-level carbon footprint reporting, alignment with recognized greenhouse gas (GHG) and dairy carbon methodologies, and the use of incentive payments for farmers that apply practices that reduce emissions.

This strategic partnership between Barry Callebaut and Arla marks an important milestone in Barry Callebaut's Net Zero roadmap. As the company's first partnership focused on reducing on-farm emissions and incentivizing farmers in dairy, the initiative lays a strong foundation for future collaborations and reinforces Barry Callebaut's commitment to decarbonizing its value chain, thereby also supporting its customers to achieve their own climate targets.

FarmAhead™ is a registered trademark owned by Arla Foods amba.

Amcor and Dow launch strategic collaboration to accelerate adoption of low-carbon packaging solutions

Amcor a global leader in developing and producing responsible packaging solutions, and Dow (NYSE: DOW), a global materials science company, today announced a strategic collaboration designed to help brands and retailers accelerate adoption of low carbon packaging solutions. Building off a shared history of advancing greenhouse gas emissions reduction efforts, the collaboration connects Amcor's packaging innovation, manufacturing expertise and global reach with Dow's low-carbon polyethylene, materials science and carbon footprint expertise. Together, Amcor and Dow aim to help brands

and retailers easily implement and scale next-generation packaging solutions that deliver the required performance, quality and functionality while helping achieve their Scope 3 targets.

Under the collaboration, Amcor and Dow will work together to identify technically and commercially viable packaging applications, engage value chain partners early in the adoption process and provide carbon footprint information to support customers as they navigate complex packaging decisions. "One of the biggest barriers to decarbonization



is the gap between consumer interest and commercial commitment," said Keith Cleason, business president, Packaging & Specialty Plastics, Dow. "Together with Amcor, we are testing a new commercial model through

market-based mechanisms to reduce adoption risk, create clearer demand signals and help accelerate commercialization of low-carbon packaging solutions across the value chain. We are making it easier for brands and retailers to evaluate and integrate low-carbon packaging options that support both business growth and sustainability objectives.”

This collaboration comes at a time when companies have set ambitious GHG emissions reduction targets for Scope 3 emissions¹, which account for indirect GHG emissions across the company’s value chain and often represent the largest share of a company’s carbon footprint. Increasingly, brands and retailers are looking for scalable packaging solutions that deliver measurable emissions reductions without requiring significant packaging redesigns or new infrastructure investments.

“Scope 3 emissions occur upstream and downstream in the value chain, making it difficult to reduce,” said David Clark, chief sustainability officer, Amcor. “Bringing low carbon polyethylene to market in packaging that meets the same technical and design standards is one of the simplest ways to help shrink a product’s carbon footprint. Because it’s truly a drop-in solution for brands, we see this collaboration as an exciting opportunity for them to translate climate commitments into action.”

Central to the collaboration is the Carbon Footprint Ledger (CFL) methodology, which is based on the existing industry precedents of mass balance in GHG accounting. CFL provides independently assured product carbon footprint information aligned with internationally recognized standards, including ISO 14067 and the Greenhouse Gas Protocol Product Standard. Combined with Amcor’s packaging expertise, the approach gives customers greater visibility into the climate impact of their packaging choices, helping them evaluate low-carbon packaging options with greater confidence and transparency.

The collaboration reflects the growing importance of coordinated value-chain action, bringing together Amcor and Dow’s complementary capabilities to help customers advance GHG emissions reductions across packaging value chains. By working across materials, packaging and customer applications, the collaboration creates a more connected approach to addressing GHG emissions challenges that can be difficult for any one company to tackle alone.

¹ Ambitious corporate climate action — Science Based Targets Initiative

Single-Dose Packaging Emerges as the Next Growth Opportunity for Brands

V-Shapes, the global leader in snap and squeeze mono-dose packaging solutions, is bringing its unit-dose packaging technology to brands looking to enhance customer experience, differentiate products, respond to changing consumption habits, and capture new market demand. The Italian packaging technology company has engineered a sustainable sachet alternative that moves beyond conventional tear-off pouches – combining an intuitive snap fold squeeze packaging opening with controlled dispensing packaging in a compact, portable pack.

Designed for high-viscosity liquids, gels, creams, and complex formulations, this one-handed opening packaging delivers precision portion control, hygiene, portability, freshness, and product protection in a single recyclable mono-material packaging proposition that eliminates zero tear-off litter.

Introducing the innovation, Abhishek Chitlangia, CEO of V-Shapes, said, “Brands are constantly looking for ways to make their products more relevant, more differentiated, and easier for customers to use. Packaging is one of the most immediate ways to influence that experience, and it should be treated as a core part of product value proposition.” He added, “Our globally patented single-dose packaging solution addresses this upfront. We are giving brands an opportunity to rethink how their product is delivered, used, and experienced. Whether the objective is portion control packaging, convenience, product protection, premiumisation, sampling, or creating a completely new consumption occasion, the packaging itself can become part of the solution.”

The shift toward mono-dose packaging is already visible in Europe, where consumption is becoming increasingly mobile, individualised, and convenience-led. Highlighting the ease of transition to mono-dose packaging for brands, Abhishek Chitlangia said, “The question for brands is no longer whether consumers have a need for single-dose formats. It is how effectively brands can use them. The opportunity now is for brands to look at what single-dose packaging can do for their products and consumers. We provide the automated packaging machinery and co-packaging contract services to make that possible.”



This innovative packaging has Targeted Cross-Industry Applications:

- **Food & Beverage:** Delivers portion control food packaging, hygienic sauce sachets, and easy-open salad dressing packs that ensure clean-consumption food packaging and reduced food waste packaging.
- **Pharmaceuticals & Healthcare:** Enables precision pharma dosing packaging, tamper-evident drug delivery packs, and hygienic liquid medicine packaging designed for accessible packaging for elderly care.
- **Nutraceuticals & Wellness:** Powers single-serve dietary supplement packs, portable energy gel packaging, and liquid vitamin unit-dose sachets that safeguard product freshness and active potency.
- **Personal Care & Cosmetics:** Elevates unit-dose cosmetic sample packaging and single-use skincare sachets with controlled dispensing cream packaging for premium beauty sampling and hygienic trial.
- **Travel & Hospitality:** Delivers single-dose hotel amenity packaging, one-handed hotel shampoo packaging, and spill-proof guest amenity packs featuring zero tear-off waste travel packs for an elevated guest experience.
- **From containing a product to enhancing its experience** is the larger proposition of V-Shapes. The pack itself becomes a key touchpoint—helping determine how a product is opened, used, precisely dispensed, and remembered.

UPM Extends Barrier Paper Technology to Label Applications



UPM Specialty Materials has extended its barrier paper technology, first introduced in the company's packaging papers, to label face papers for the first time. The new grade, UPM Asendo™ 80, applies that grease-resistance technology to labelling without the use of PFAS. The EU's Packaging and Packaging Waste Regulation (PPWR) introduced a restriction on per- and polyfluoroalkyl substances (PFAS) in food-contact packaging, which became applicable across the European Union on August 12, 2026. Label converters serving food-contact and other grease-sensitive applications, such as olive oil packaging, require face papers validated to perform without relying on PFAS chemistry.

UPM Specialty Materials does not add PFAS to its papers at any stage of production. Each grade is tested by independent, third-party laboratories, providing converters with the documentation required for their own customers.

UPM Asendo™ 80 is compatible with a range of adhesive types, is suited to UV Flexo and UV-inkjet printing, and is available as FSC™ or PEFC certified*, meeting the U.S. Food and Drug Administration (FDA) and The German Federal Institute for Risk Assessment (BfR) requirements for food-contact use. With this launch, UPM Specialty Materials has expanded its range to include an 80 gsm basis weight, typically used in label end-uses. Label converters can draw on UPM's technical team for guidance on design considerations when adapting UPM Asendo™ 80 to a particular label format.

"Bringing our barrier technology from packaging into UPM Asendo™ 80 gives label converters access to grease resistance that has been validated over years of use in demanding packaging applications. It also helps converters grow and win by opening the door to higher-value label applications," says Kirsi Lahtela, Product Manager, UPM Specialty Materials.

Converters evaluating UPM Asendo™ 80 for a specific end use can request samples for testing under their own production conditions, supported by UPM Specialty Materials throughout the evaluation.

*FSC C014719, PEFC/02-31-80
www.upmspecialtymaterials.com

Nestlé Targets 12–17% Reduction in Virgin Plastic Use by 2030

Nestlé has outlined a revised packaging sustainability strategy targeting a 12% to 17% reduction in virgin plastic use by 2030, compared with its 2018 baseline. The food and beverage company said the target will be achieved through three key areas: increasing recycled plastic content, reducing or eliminating plastic packaging, and developing reuse and refill solutions. The strategy follows Nestlé's earlier goal of making all packaging recyclable, compostable or reusable, which reached around 90% of its portfolio.

Nestlé expects 50% to 60% of the planned reduction to come from greater use of recycled plastic. Recycled content accounted for about 21% of its plastic packaging in 2025, with the company researching the food-safety potential of recycled plastics to expand recycled PET use. Another 30% to

40% is expected from reducing or eliminating plastic, including replacing plastic laminates with paper-based alternatives. Nestlé's plastic packaging volume fell from 1.7 million metric tonnes in 2018 to 0.86 million tonnes in 2025, while the company has joined the Ellen MacArthur Foundation's PaperFlex Consortium to advance paper-based flexible packaging.

The remaining 10% to 15% of the reduction is expected from alternative materials and reuse or refill models. Nestlé said only 0.51% of its packaging was reusable in 2025 and identified at-home refill formats as an area with further potential. However, the company noted that many reuse and refill solutions remain at the pilot stage. The 2030 target also takes into account Nestlé's planned \$3.4 billion sale of a stake in its water business. (Food Dive)



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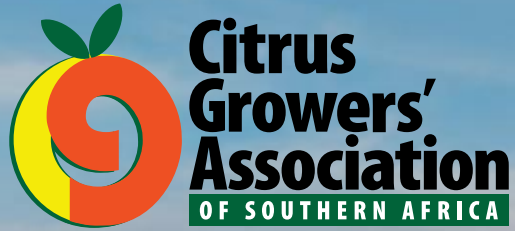
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