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12 Years

Food & Beverages Processing

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Dear Readers,

As we step into 2026, the food and beverage processing industry stands at a defining crossroads marked by innovation, accountability, and swift change. In this January edition, Food & Beverages Processing presents a carefully selected range of articles that mirror the shifting priorities of processors, brand owners, technology innovators, and supply chain partners across the entire value chain. Addressing evolving consumer demands, heightened regulatory oversight, and progress in processing, packaging, ingredients, and logistics, this edition offers a clear perspective on the direction the industry is set to take in the year ahead.

Our processing segment opens with an in-depth exploration of The Bakery Trends That Will Define 2026, examining how health-led formulations, automation, clean-label ingredients, and premiumisation are reshaping one of the most dynamic categories in food processing. Alongside this, we address a pressing and sensitive issue with Food Adulteration in India, examining its impact on consumer trust, regulatory frameworks, and the role of technology and testing in ensuring food safety. Completing the processing focus is Water Content in Butter Production, an insightful look at quality control, compliance, and efficiency in dairy processing, highlighting how precision and process optimisation are becoming non-negotiable in modern manufacturing.

In our packaging segment, we turn the spotlight on one of India's fastest-growing snack categories with Snacks and Namkeen Packaging: Shaping the Future of India's Savoury Food Industry. This feature captures how innovative packaging formats, material choices, and sustainability-driven design are influencing shelf appeal, freshness, and brand differentiation. Complementing this is The On-the-Go Food Packaging Market, which explores the rapid expansion of convenience-led packaging solutions driven by urban lifestyles, changing consumption habits, and the growing demand for recyclable and lightweight packaging options.

The ingredients segment reflects the industry's growing emphasis on functionality, nutrition, and alternative food sources. Fruit Powders as Ingredients and Their Application in Bakery Products highlights their rising role in enhancing flavour, colour, nutrition, and shelf life while meeting clean-label expectations. We also explore value creation from agricultural resources in Transforming Banana and Their Biomass: A Nature's Gift into Next-Gen Products, showcasing how innovation is unlocking new business opportunities from what was once considered waste. Adding to this is The Rapid Rise of Plant-Based Meat in the Global Food Industry, a timely feature examining the drivers, challenges, and future potential of alternative proteins as sustainability and health take centre stage.

Thank you for being a part of our journey this year. We look forward to stepping into 2026 with renewed energy, deeper insights, and a stronger commitment to serving the global food and beverages community.

Further, Please log on to our website (www.foodnbeveragesprocessing.com) for more articles.

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Contents

PROCESSING TECHNOLOGY

PACKAGING TECHNOLOGY

INGREDIENTS & ADDITIVES

WAREHOUSING & LOGISTICS

Contents

CORPORATE HAPPENINGS

SUSTAINABILITY

NEWS & INDUSTRY UPDATES

Anmol Industries introduces new Cream Roll and Mango Swiss Roll for value-focused snack buyers

Anmol Industries Limited, a prominent player in the Indian packaged food market, has introduced two new additions to its range. The company has launched Anmol Cream Roll and Anmol Swiss Roll in Mango flavour, both priced affordably. The new products add a few extra choices to the value snacking range and still carry the taste people already associate with Anmol.

With these additions, Anmol further builds its presence in the indulgent snacking category. The Anmol Cream Roll offers a light and creamy bite with a soft and smooth texture, while the Swiss Roll in Mango flavour provides a gentle and refreshing flavour that resonates with consumers across regions as well as the age groups.

Commenting on the new additions, Mr. Aman Choudhary, Executive Director – Marketing, Anmol Industries Limited said, "With the Cream Roll and the Swiss Roll in Mango flavour, we are adding more variety to our range in a way that stays true to what consumers expect from us, that is enjoyable flavours, reliable quality, and easy accessibility. These products are meant to offer simple, everyday indulgence without stretching the pocket."

Both products are made at Anmol's own manufacturing facilities, which help the company maintain steady freshness and quality across batches. With the affordable price point, consumers across villages, cities and smaller towns can pick up the products without any hesitation. It also aligns with Anmol's ongoing effort to keep its offerings affordable for a wide mix of buyers.

The company has already begun distributing both products through its regular retail network, so they will start appearing on shelves across different regions. The introduction of these two treats further strengthens Anmol's expanding line-up of value-driven indulgent foods.

Nutrica expands its wellness portfolio with the launch of Peanut Butter range

Nutrica, the lifestyle and wellness brand under BN Agritech Limited, has announced its foray into the peanut butter category with the launch of Nutrica Peanut Butter. The range marks the brand's next step toward building a complete wellness portfolio that combines taste, quality, and functionality to support everyday health goals. Nutrica Peanut Butter is now available across general trade stores in 14 cities including Delhi, Mumbai, Pune, and Chandigarh.

Available in two variants, Crunchy and Creamy, the new peanut butter range offers a healthy snacking option for everyday fitness, making nutrition simple and enjoyable. Fitness is not limited to gyms or just one individual, it's a daily habit the whole family can adapt, from children to elders. Replacing regular spreads with peanut butter becomes a small, easy switch that gives everyone at home a healthier option and creates a big, long-term difference in overall lifestyle. Both variants are high in protein, rich in fibre, made from 100% vegetarian ingredients, and contain no artificial preservatives, making them a wholesome, energy-dense choice for active lifestyles. The range comes in convenient PET jars of 300g, 750g, and 900g.

Commenting on the launch, Sparsh Sachar, Director and Business Head – FMCG, Nutrica, said, "With every product we introduce, our aim is to make health simpler, more accessible, and enjoyable for everyone. The peanut butter range embodies our belief that nutritious food can be delicious too. We want to make healthy choices easy and exciting for consumers, not something they have to compromise for. This launch is another step toward creating a wellness brand that fits naturally into modern lifestyles."

Nutrica's entry into the peanut butter category follows the success of Nutrica Bee Honey and its vitamin-enriched cooking oils, further strengthening the brand's function-first wellness portfolio. With this expansion, Nutrica continues its journey toward becoming a comprehensive lifestyle and wellness brand, offering premium yet accessible products that make wholesome nutrition an effortless part of everyday living.

Gopal Snacks Introduces New Product Names to Boost Clarity and Modernise Brand Identity

Gopal Snacks, one of India's leading companies in the organised traditional snacks sector, has undertaken a series of strategic product name updates across its portfolio to improve consumer clarity, enhance brand relevance in non-core markets, and ensure that each product name accurately reflects its flavour profile and identity. As part of this initiative, Nadiyadi Mix has been rebranded as Bombay Mix in markets outside Gujarat. The move leverages a name that is widely recognised across India and internationally, helping the product better connect with consumers seeking robust, spicy flavours.

Along the same lines, Vanela Gathiya is being marketed as Premium Gathiya, providing a simpler, more accessible name for consumers unfamiliar with regional terminology. Additionally, Nylon Gathiya has been renamed Makkhan Malai Bhujia in non-core markets. The new name not only reflects the snack's melt-in-the-mouth texture but is also expected to drive wider acceptance by removing the negative connotations associated with the word "Nylon" outside Gujarat. Both products belong to Gopal Snacks' acclaimed World's No. 1 Gathiya range.

Gopal Snacks has also renamed Sweet Farali Chivda to Rajwadi Farali Chivda, enriched with raisins to deliver a more premium, royal flavour profile. For non-core markets, Tikhi Sev has been rebranded as Rajasthani Bhujia Sev, a name that resonates strongly with consumers who associate Rajasthani cuisine with bold, spicy flavours.

Raj Hadvani, Whole-time Director and CEO of Gopal Snacks, said, "At Gopal Snacks, our mission has always been to create products that truly connect with consumers. These name enhancements improve clarity, modernise our identity where needed, and ensure our products are instantly relatable in Gujarat and across India. The rebranding reflects our commitment to staying aligned with evolving consumer preferences, while delivering authentic taste."

Strengthening its modern snacking portfolio, Gopal Snacks has rebranded its Cornigo Nachos range to Cristos Nachos. Both variants, Cheesy and Thai Chilli, now adopt a modern identity aimed at younger and trend-focused consumers, while maintaining their gluten-free, non-GMO corn recipes and signature crunch. This change is expected to deepen appeal among health-conscious and modern snack enthusiasts. Similarly, Khatta Mitha Sev Murmura has been rebranded as Chatpata Sev Murmura, a name that better communicates its lively, tangy taste, while Aloo Sev has been renamed Aloo Bhujia Sev. The new name clarifies that the product is a Bhujia-style sev made from potato and gram flour, helping reduce consumer confusion while retaining the same crispy, tangy flavour profile.

Earthling announces strategic expansion to transform india's horeca supply chain

EARTHLING, India's rapidly growing foodservice solutions company, today announced the strategic expansion of its geographical and distribution footprint to strengthen supply reliability, product availability and operational efficiency for commercial kitchens across the country.

Currently present in 12 states with over 200 distributors, EARTHLING plans to enter 7 new states, add 100 new distributors, and establish 3 new regional warehouses to support the rapidly growing needs of India's HORECA sector. Earthling's planned expansion focuses on deeper market access and improved availability of clean-label, ready-to-use ingredients for chefs, culinary teams and kitchen decision-makers.

"As India's foodservice industry scales rapidly, kitchens need partners who can deliver consistency without complications," said Ms. Shippy Sharma, Managing Director, Earthling Consumer Products Pvt. Ltd. "This expansion reinforces our commitment to being a one-stop partner for HoReCa businesses seeking reliable, high-performing, and chef-focused food solutions."

Earthling's portfolio currently includes tomato purees, canned vegetables, canned fruits, premium olive oils, global sauces, culinary condiments, beverage mixes and essential pantry staples, each designed to meet strict standards of hygiene, safety and taste for foodservice operations. With a wide and growing range of SKUs across core HoReCa categories, the company enables professional kitchens to source multiple ingredients from a single, dependable partner. The company also serves as the exclusive import partner for Lee Kum Kee for North India, strengthening its portfolio with globally trusted Asian sauces and condiments.

With this expansion, EARTHLING aims to support QSR chains, fine-dining restaurants, banquets, caterers, cloud kitchens and institutional kitchens with consistent access to high quality ingredients that perform reliably in high pressure commercial cooking environment. The company's five-year roadmap includes deeper penetration across India's B2B food network, a broader and more diversified product range, and improved access to premium, ready-to-use solutions for professional kitchens nationwide.

Koffelo Launches NOC in India

Koffelo, a new-age Indian coffee brand focused on innovation and convenience, has announced the launch of NOC (Nitrogen Over Coffee), India's fastest cold brew shot that prepares café-level coffee in just five seconds, eliminating the traditional 8-24 hours brewing process.

With NOC, Koffelo offers a compact 20 ml, 2.4x concentrated cold brew shot that instantly transforms into smooth cold brew when mixed with water or milk. Each NOC shot delivers 2.4 times more natural caffeine with only 15 calories and offers low acidity, less bitterness with no added sugar. The product is positioned as a cleaner alternative to energy drinks, providing sustained energy without crashes, jitters or stomach discomfort.

Cold brew coffee is prepared through Patented Super Drop Technology with Brazilian and Ethiopian Arabica beans. It is slow-extracted for flavor, aroma and sealed to stay fresh, stable and consistent. It has found flavor among fitness-conscious consumers, working professionals, students and wellness-focused millennials seeking stable energy throughout the day. NOC uses nitrogen infusion, a technique commonly found in premium beverages, to enhance texture and freshness. When poured, the shot produces a distinctive hiss and cascading visual effect, creating a creamy mouthfeel without the use of chemicals or preservatives.

According to the company, NOC collapses the entire cold brew process into a simple shot-and-pour experience, requiring no machines, brewing knowledge or waiting time. The product can be consumed with hot or cold water, milk, soda, tonic or even used in smoothies and mocktails.

Speaking about the launch, Gaurav Varshney, Founder at Koffelo, said, "Cold brew in India was either too slow or too inaccessible. With NOC, our goal was to take a premium café experience and make it part of everyday life. Coffee should move at your speed, not slow you down."

The launch marks a first-mover entry into India's emerging fast cold brew segment, combining convenience with premium coffee craftsmanship.

The product is part of Koffelo's growing portfolio under Morning Brew Pvt. Ltd., which focuses on building a modern, convenience-led coffee ecosystem in India. The other offerings include Cold Brew Signature Instant Powder, Instant Specialty Coffee made from Indian Robusta, Extra Bold Coffee and Coffee Strong blends. With the introduction of NOC, Koffelo aims to redefine how Indian consumers experience cold brew, aligning premium coffee culture with fast-paced lifestyles.

QNET Expands Wellness Portfolio in India with the Launch of Ayurvedic Nutriplus JointPro Health & DigestPro Health

QNET, one of the leading global direct-selling companies, has announced the launch of two new additions to its growing Ayurvedic wellness range in India, Nutriplus JointPro Health and Nutriplus DigestPro Health. Designed for modern lifestyles marked by stress, long work hours, and sedentary habits, both products combine time-tested Ayurvedic ingredients with scientific innovation to support everyday health and vitality.

Nutriplus DigestPro Health is an Ayurvedic proprietary formulation that supports healthy digestion, gut balance, and nutrient absorption. Digestive issues such as acidity, bloating, sluggish metabolism, and irregular bowel movement have become increasingly common due to erratic schedules and poor dietary habits. DigestPro Health brings together a powerful blend of herbs known for their digestive and detoxifying properties, featuring Patola (Trichosanthes dioica), Haritaki (Terminalia chebula), Bibhitaka (Terminalia belerica), Amalaki (Emblica officinalis), Chiraita (Swertia chirata), Parapat or Pitpapara (Fumaria parviflora), Sunthi

(Zingiber officinalis), Kutaki (Picrorhiza kurroa), Bhringaraj (Eclipta alba), and Saunf (Foeniculum vulgare). These ingredients work synergistically to ease digestion, support liver health, enhance metabolism, and promote long-term digestive wellness.

Nutriplus JointPro Health is formulated to support joint mobility, flexibility, and overall musculoskeletal well-being. With joint discomfort affecting younger and older adults alike, often due to prolonged sitting, digital habits, and stress-driven inflammation. JointPro Health offers a natural daily companion for enhanced movement and reduced stiffness. The formulation combines well-researched Ayurvedic herbs including Nirgundi (Vitex negundo), Tea (Camellia sinensis), Sunthi (Zingiber officinalis), Ashwagandha (Withania somnifera), Kunduru or Shallaki (Boswellia serrata), and Haridra (Curcuma longa). Together, these botanicals help reduce inflammation, strengthen joint function, and elevate overall mobility.

Recommended usage for both Ayurvedic formulations is one capsule twice a day before meals or as directed by a physician. They are suitable for individuals aged ten years and above, with each unit containing a net quantity of 60 capsules. Nutriplus DigestPro Health is priced at ₹2,780, and Nutriplus JointPro Health is also priced at ₹2,780.

Nutriplus DigestPro and Nutriplus JointPro are powered by two advanced natural technologies – Bioplantex™ Extraction Technology and Naisumi™ Metabolic Support – that significantly elevate the efficacy of their Ayurvedic formulations. Bioplantex™ uses a non-toxic, eco-friendly extraction process that preserves maximum bioactive potency and ensures consistent strength in every capsule. Complementing this, Naisumi™ acts as a natural insulin-mimetic system to enhance glucose metabolism, energy utilisation, and post-digestion nutrient absorption. Together, these innovations deliver cleaner, safer, and more effective plant-based support for digestive wellness and joint health.

Nutriplus JointPro Health and DigestPro Health are Ayurvedic proprietary medicines. Pregnant or lactating women, and individuals with pre-existing medical conditions, should consult a physician before use.

QNET India now offers the advanced Nutriplus JointPro Health and DigestPro Health formulations exclusively on the QNET India eStore.

Revolutionizing modern cooking: Maggi partners with Ninja in MENA, expands range to new markets

Nestlé's iconic Maggi brand has teamed up with Ninja, one of the world's leading air fryer brands, to deliver innovative air fryer solutions to consumers in the Middle East and North Africa (MENA). Building on the rising popularity of these novel kitchen appliances in the region, this collaboration aims to inspire wholesome, more convenient, delicious home cooking.

Maggi and Ninja have co-led integrated promotional activations at various physical and digital touchpoints across the region. This also includes influencer partnerships and exclusive e-commerce offers, enabling greater access for the consumers. Additionally, 'Black Friday' activations in electronic retail outlets across Saudi Arabia, the United Arab Emirates, Kuwait and Qatar have already helped expand Maggi's reach. Maggi's air fryer mixes in MENA are inspired by the region's most-searched recipes, blending beloved local flavors like garlic and herbs with global favorites such as Mexican fajita, hot buffalo and Korean barbeque mixes.

Nikhil Chand, Head of Food Strategic Business Unit at Nestlé, said: "Maggi, the world's leading food brand, is joining forces with Ninja to help MENA consumers discover the latest in modern cooking. With our air fryer mixes, we are making it easier for people to utilize their devices to prepare fresh, tasty and wholesome meals. This partnership, along with launches in other key markets, like Mexico and France, reflects Nestlé's commitment to investing in its strategic consumer platforms."

At the same time, Nestlé is also expanding the Maggi air fryer range to new geographies. In Mexico, where Maggi seasoned papyrus sleeves for air fryer use are already offered, the company has launched Maggi crunchy seasonings in three different flavors: Teriyaki, Sweet Chipotle, and Lemon Pepper. Continuing its expansion across continental Europe, Nestlé in France is offering Maggi seasoning blends, including Crispy Cheese Chicken, Mexican Style Chicken Fajitas and Paprika Homemade Fries. Maggi's air fryer seasonings are empowering consumers everywhere to achieve the perfect taste and texture.

The roll out of these products follows Nestlé's expansion of its modern cooking portfolio globally across the US, Chile, UK, Germany, Spain, Portugal, Netherlands, Poland, Hungary, Italy, Greece, Finland, Norway, Denmark, Australia, New Zealand, Malaysia, Singapore and China.

Ishida Announces Acquisition of RobotGrader AB to Advance Protein Packing Automation

Ishida, the world leader in end-to-end weighing, packing and quality control solutions, is pleased to announce the acquisition of Swedish robotics automation expert, RobotGrader AB. This exciting development marks a strategic expansion of Ishida's automation capabilities, enabling protein processors to benefit from smarter, automated fixed weight tray-packing systems, supported by enhanced service and project expertise.

This acquisition strengthens Ishida's expertise and reinforces its position as a market leader in protein packing automation, whilst paving the way for further innovation. New product development is already underway to address the industry's evolving needs, further strengthening Ishida's competitive edge across Europe and globally. This also reflects a clear commitment to continuous technological advancement, ensuring customers benefit from the most advanced solutions in protein packing automation.

Both companies are family-owned and share a dedication to engineering excellence and customer service, helping to maintain a strong, values-driven culture as the business grows. Based in Mölndal, Sweden, RobotGrader was founded by Sverre Stenbom in 2004. Today, RobotGrader consists of a team of highly skilled mechatronics engineers who design innovative robotic equipment integrating weighing, grading and pick and place technologies.

The two companies have enjoyed a successful partnership since 2014, with Ishida serving as the exclusive European distributor of RobotGrader's systems for more than a decade and installing systems in 13 countries worldwide. With RobotGrader now fully integrated within Ishida's direct offering for food manufacturers, customers will benefit from greater access to technical expertise, spares parts, and project support. A planned expansion of the RobotGrader team will further strengthen service capabilities and system optimisation.

Darren Chandler, General Manager for Protein Solutions at Ishida Europe, commented: "RobotGrader has long been known for its innovative robotic grading systems, and this move brings together two family-owned businesses with a shared commitment to engineering excellence and quality service. We are excited to build on the success we've experienced already.

Precision tray-packing technology is becoming ever-more important to improving performance while reducing food waste and giveaway. We are confident our even closer ties will lead to even greater innovation in this space, and ensuring RobotGrader's team can continue to flourish.

Depending on the machine and product type, RobotGrader's solutions can handle up to 320 pieces per minute, whilst reducing reliance on labour, increasing pack output and achieving low levels of give-away."

Dave Tiso, Managing Director at Ishida Europe, added: "With automation high on food manufacturers' agendas, we are pleased to be able to offer RobotGrader solutions as a direct part of the Ishida portfolio. With Ishida's experts in weighing, packaging and quality control, and RobotGrader's mechatronics specialists working more closely together than ever before, we can provide even deeper integration to serve the needs of protein processors globally."

Sverre Stenbom, who will remain actively involved in the business said: "This is a very positive move for both companies and clearly demonstrates the ambition of Ishida to be a major contender in the protein packaging and automation sector. I am looking forward to seeing what the future holds."

https://www.ishidaeurope.com/en/products/grading-marination/grading-and-marination/robotgrader/

Twinings India Refreshes Its Iconic Identity with Elegant New Packaging,

Marking a New Chapter in Its 300-Year Legacy

Twinings, one of the world's oldest tea houses, has introduced its new packaging in India, marking an important moment for the brand. With a legacy of over 300 years, the refreshed packaging represents a new chapter in Twinings' journey of tea expertise, innovation, and craftsmanship. While rooted in British heritage, the new design is created for today's global consumer and reflects the brand's evolution while staying true to its long-standing promise of quality and flavour.

The launch is made even more special by the presence of Stephen Twining, a tenth-generation member of the Twining family and Master Blender, highlighting the brand's strong legacy and its commitment to the Indian market. The new packaging is designed to improve shelf appeal and make it easier for consumers to explore the range, with clearer

information on tea origins, flavour profiles, and sensory notes for a more Seamless and engaging experience.

In India, Twinings offers a carefully selected range of its most popular blends, including English Breakfast, Earl Grey, Pure Green Tea,

Chamomile, Lemon & Ginger, and Assam Second Flush CTC. For consumers who view tea as a mindful ritual, Twinings also presents its ultra-premium Orthodox loose-leaf teas, Assam Second Flush, Whole Green Leaf, and Darjeeling, in packaging that reflects their artisanal quality and depth.

While the packaging has been updated, Twinings' high standards remain the same. Each blend is created by expert Master Blenders and Herbalists and is tasted several times from bush to shelf to ensure the right balance, aroma, and consistency. Today, Twinings teas are enjoyed in more than 120 countries, offering moments of comfort, energy, and calm across cultures.

Beyond tea, Twinings remains committed to responsible sourcing through its Sourced With Care programme, working closely with Rainforest Alliance Certified farms and the Ethical Tea Partnership to support farming communities and promote sustainable practices. As the brand strengthens its presence in India, the new packaging reflects Twinings' enduring spirit, where heritage meets modernity, and every cup celebrates craftsmanship.

A new look. The same timeless Twinings promise.

ADM and Bayer expand sustainable soybean farming initiative in Maharashtra

Germany's Bayer AG on Monday said it has extended its partnership with US agribusiness ADM by three years to support soybean farmers in Maharashtra, scaling the programme fourfold to reach 1,00,000 growers.

The partnership, launched in June 2022, reached 25,000 farmers by May 2025 and will now expand coverage from 35,000 hectares to 200,000 hectares, Bayer said in a statement. The expanded programme will cover seven districts in Maharashtra, adding Nanded, Parbhani, Hingoli, and Solapur to the original areas of Latur, Dharashiv, and Beed.

The initiative focuses on sustainable farming practices through the ProTerra Foundation framework, covering production management, biodiversity protection, programme monitoring, crop documentation and post-harvest management, the company said. Bayer has delivered training programmes on good agricultural practices and integrated pest management, reaching over 58,000 farmers through audio bridge calls, while ADM's agronomist team receives regular training on crop cultivation and pesticide management.

"By leveraging ADM's market linkages and global resources, we aim to equip 1,00,000 farmers with the tools to strengthen economic resilience," said Amrendra Mishra, Managing Director of Ag Services and Oilseeds and Country Manager India at ADM. ADM operates more than 50 crop development and procurement centres in India and has businesses spanning oilseed processing, commodities trading, and animal and human nutrition.

THE BAKERY TRENDS THAT WILL DEFINE 2026

The bakery industry is entering 2026 with real momentum. Globally, baked goods already represent a market of more than half a trillion dollars and are projected to grow steadily toward 700–900 billion dollars by 2030, driven by urbanization, rising incomes and constant product innovation.

At the same time, the context around that growth is changing fast. Cities are getting bigger, populations are aging in some regions and getting younger in others, and consumers are far more intentional about what they eat and how it is produced. There are now more than 30 megacities worldwide, each with over 10 million inhabitants, concentrating purchasing power and accelerating demand for packaged foods and bakery products. For industrial bakeries, 2026 is not just "more of the same." It is a year where health, indulgence, sustainability and automation converge on the production floor.

Below is a strategic look at the forces that will shape baked goods and industrial bakery operations in the coming year.

1. Protein moves from niche to norm

Health and wellness are no longer side trends. Around 67% of consumers now say they choose food based on its health benefits, and protein has become one of the most desired attributes on the bakery label.

Nearly 3 in 10 shoppers already check packaging for protein content, a figure that climbs even higher in some regions. Online conversations about protein-enriched baked goods are forecast to grow another 17% in 2026, with searches for "protein bread" and "high protein dessert" continuing to rise.

What this means for industrial bakeries:

- Everyday categories such as sandwich bread, buns and cookies are being reformulated with added plant or dairy proteins.
- Doughs become heavier and more hydrated, demanding precise mixing, handling and dividing to maintain structure and softness at scale.
- Lines that once ran standard white or brown recipes must now switch seamlessly between enriched, seeded and protein-boosted variants during the day.

The opportunity is clear: bakeries that can reliably produce high-protein, "functional indulgence" products without sacrificing eating quality will win shelf space and loyalty

2. Texture becomes the new signature

In 2026, texture is as important as taste. Research shows 71% of consumers say texture is a key driver of food enjoyment, and 67% are actively looking for new texture experiences.

This is fueling the rise of "texture mashups"; products that combine crunchy with chewy, crispy with soft, or flaky layers with creamy fillings. Crunchy and crusty profiles are especially in demand, with online conversations about crunchy bakery textures expected to increase by around 19% in 2026, after strong growth in 2025.

For industrial production, this raises the bar for process control:

- Sheeting and laminating systems must create repeatable layers that deliver a defined "texture signature."
- Vision systems can help monitor crust color, crumb openness and topping distribution in real time.
- Changeovers between soft rolls, seeded crusts and laminated specialties need to be fast, without compromising consistency.

Texture is becoming a core part of brand identity. The products that stand out will be the ones whose bite feels as carefully engineered as their flavor.

3. Sourdough moves from trend to supertrend

Few developments are as striking as the five-year rise of sourdough. Global data shows sourdough is again the number one talked-about bakery trend, and consumer interest has more than tripled in recent years, reaching its highest point ever in 2025 and continuing upward into 2026.

The reasons are clear:

- 58% of consumers believe sourdough makes bread healthier, often linked to better digestibility and gut health.
- 70% say it improves flavor, delivering deeper, more complex profiles.
- Product launches featuring a sourdough claim have increased by 31% worldwide, with a further 33% growth forecast for 2026, and not only in bread but also in sweet goods and snacks.

For industrial bakeries, sourdough is no longer a boutique project. It requires:

- Long, controlled fermentation with stable temperature and humidity over many hours.
- Gentle dough handling to preserve gas cells and structure at high throughput.
- Accurate proofing profiles to balance flavor, volume and crust.

The winners will be bakeries that can deliver authentic sourdough character with the reliability and efficiency of a fully automated line.

4. Pizza, pinsa and the next generation of flatbreads

The global pizza category continues to grow, with long-term projections pushing the market well beyond 200 billion dollars

in the coming decade. Within that category, new formats are rewriting expectations.

On one side, consumers are embracing lighter, highly fermented bases such as pinsa, with airy crumb structures and crisp crusts that promise "better-for-you" indulgence through long fermentation and high hydration.

On the other, rich styles with caramelized edges, generous toppings and bold visual signatures continue to define pizza as the ultimate comfort food.

These movements create complex manufacturing demands:

- Lines must handle very wet, fermented doughs without degassing them.
- Sheeting and pressing systems need to support diverse formats, from oval pinsa to pan pizzas and Roman-style slabs.
- Hybrid or multi-zone ovens must deliver different bake profiles within the same system to support mixed SKU programs.

Pizza and flatbread lines that combine gentle dough handling, flexible shaping and precise thermal control are becoming strategic assets for bakeries that want to stay ahead of this evolution.

5. Clean label, authenticity and "real" recipes

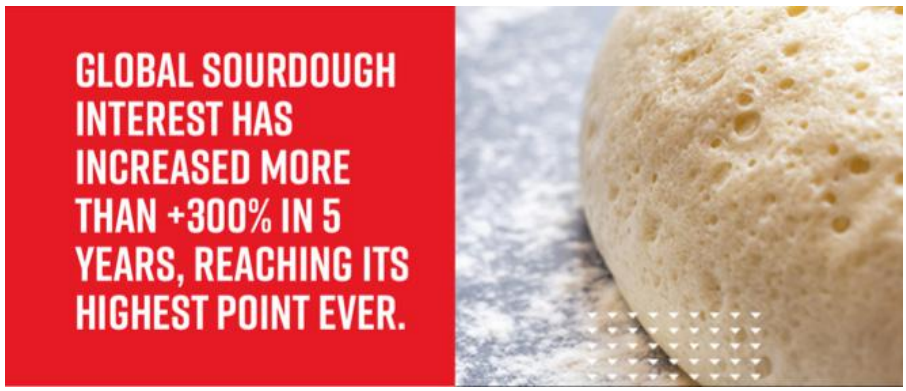
Alongside innovation, there is a strong pull back to simplicity. Consumers are scrutinizing ingredient lists and seeking products that feel less processed and more "real."

Clean label has moved beyond buzzword status:

- A growing share of new bakery launches highlight short, recognizable ingredient lists and the absence of artificial additives or preservatives.
- Heritage and traditional recipes are seeing renewed interest, with more products carrying "authentic" or "traditional" claims as proof of origin and craft.

For industrial bakeries, this typically means:

- Relying more on process – fermentation, enzymatic improvement, precise proofing – and less on chemical shortcuts.
- Investing in hygienic designs and controlled environments that support quality and shelf life even as additives are reduced.
- Building transparent sourcing stories around grains, fats and toppings.



Authenticity is becoming a differentiator, especially in mature markets where consumers are willing to pay more for products that feel genuine and trustworthy.

6. Automation and AI move from option to necessity

Behind every trend on the shelf sits a

production reality: tight labor markets, rising input costs and growing product complexity. Many bakeries report difficulty filling skilled roles, and industry studies project a shortfall of more than 50,000 bakery workers in some key markets by 2030 if nothing changes.

As a result, automation and digitalization are now at the top of the investment agenda:

- Smart ovens and proofers adjust temperature, humidity and time automatically based on sensor feedback.
- Robotic systems handle tasks from dough loading to packaging, improving consistency and reducing ergonomic strain for staff.
- Vision AI inspects shape, color and topping placement in milliseconds, helping cut waste and rework while supporting premium positioning.

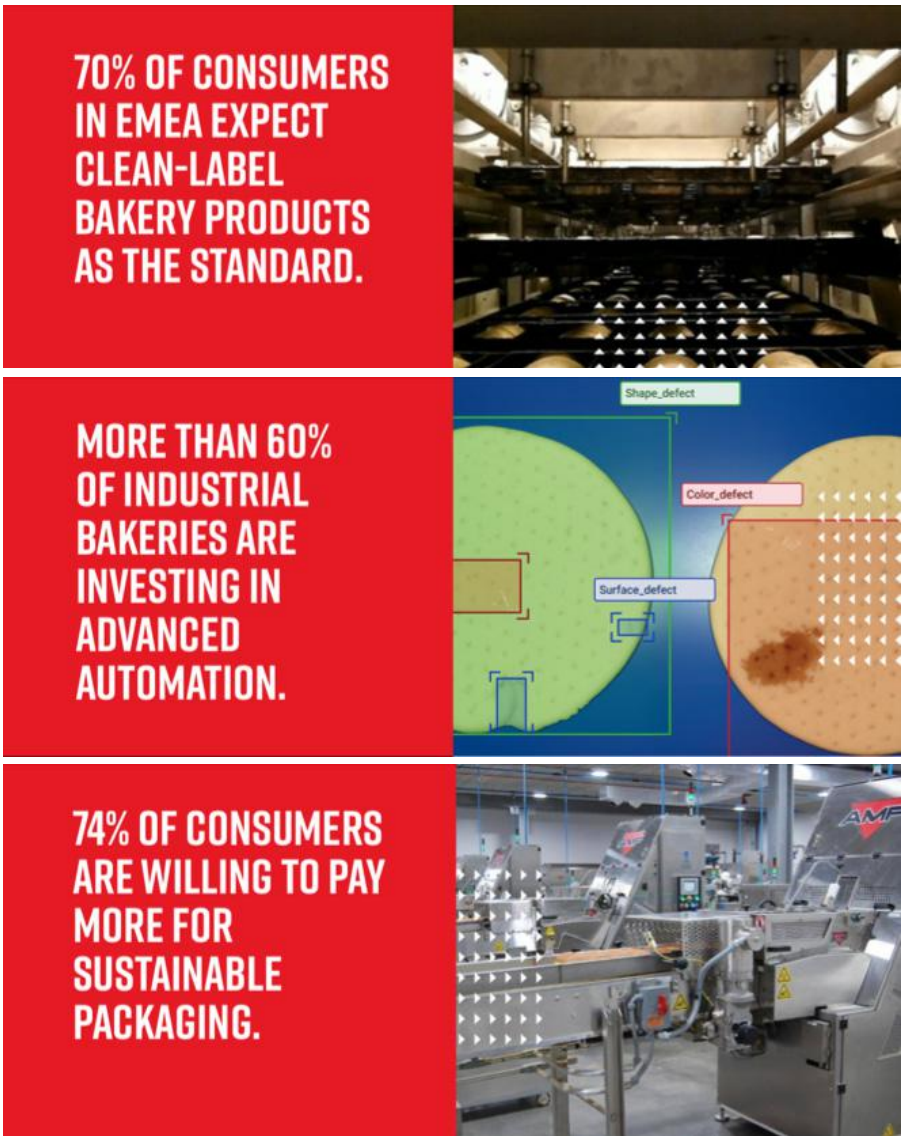
Data is becoming the invisible ingredient of the bakery. Connected equipment, line dashboards and predictive maintenance tools are turning factories into "smart bakeries" that can react in real time to variation in ingredients, demand or process conditions.

Automation is no longer about replacing people; it is about enabling teams to focus on higher-value work while maintaining throughput and quality in an increasingly complex product landscape.

7. Sustainability as standard, not bonus

Finally, sustainability has shifted from marketing claim to operational baseline. Across the value chain, pressure is growing from consumers, retailers and regulators:

- The industry is moving toward more sustainable ingredients, including regenerative grains and upcycled inputs such as spent grain or fruit pulp.
- Energy efficiency and emissions reduction are key drivers of investment in new ovens, coolers and heat-recovery systems.
- Recyclable and compostable packaging, waste reduction programs and improved traceability are becoming requirements for doing business with major retailers.



For industrial bakeries, the most compelling sustainability strategies are those that also improve economics: less scrap, lower energy consumption per ton of product, more efficient use of labor and raw materials.

Putting it together: from trends to decisions

Taken together, these forces point toward a clear direction for 2026:

- Health and indulgence are converging, not competing. Protein, fiber, fermentation and portion control will increasingly shape the bakery aisle.
- Experience-driven products – defined by texture, flavor fusions and visual appeal – will separate premium players from the rest.
- Process intelligence and automation will be essential to manage complexity, protect margins and compensate for labor shortages.
- Sustainability and transparency will move from "nice-to-have" to basic expectation in customer conversations.

Industrial bakeries that align their product roadmaps, process investments and technology choices with these trends will be best positioned to grow. Whether they are scaling sourdough, exploring pinsa, launching high-protein buns or rethinking energy across their ovens.

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2025 Post Show Report

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Water Content in Butter Production

Process optimisation with microwave technology

In modern dairy processing, precision is no longer just a mark of quality but a key economic factor. This is especially evident in butter production, where the moisture content must be carefully balanced. Depending on production conditions and process parameters, the moisture content can vary between 15% and 17%. However, the legal limit in the European Union is 16%. If the moisture content exceeds this threshold, the product cannot be sold. To avoid exceeding the legal limit, many manufacturers intentionally set a lower target moisture content, typically between 15% and 15.5%. However, this precautionary buffer reduces profitability: even a slight decrease in water content increases the fat proportion in the product, resulting in financial losses. Moreover, insufficient moisture can negatively impact butter quality, compromising spreadability and lead to an undesirable texture.

It is evident that reliable, continuous moisture measurement directly within the production line is essential. Only with real-time monitoring can water addition be automatically regulated, enabling butter production to be optimized for consistent quality and maximum efficiency.

This study examines the practical application of the MicroPolar LB 566, an advanced microwave measurement system designed to determine moisture content in butter. The system delivers precise, non-destructive measurements using microwave technology and is specifically engineered for seamless inline integration into dairy production processes. The goal is to provide manufacturers with an optimal solution to increase yield, ensure product quality, and reliably comply with legal requirements.

Measurement principle

Microwave transmission technology is a reliable and well-established method for rapidly determining the moisture content in dairy products such as butter. The core principle of this technique is based on the interaction of electromagnetic waves with the dielectric properties of the product. Because butter is mostly made up of fat and water, the method takes advantage of the big difference between the electrical behavior of water and fat. Water has a much higher ability to absorb and transmit electromagnetic energy compared to fat, so even small changes in moisture levels can be detected very accurately.

The MicroPolar LB 566 measures both the phase shift and attenuation changes of microwaves transmitted through the product. By evaluating these parameters simultaneously, the system is able to quantify moisture content in real time, non-destructively and with high accuracy.

The system operates within a frequency range where conductivity has minimal impact on measurement accuracy and repeatability. Furthermore, it features a specialized sensor specifically engineered to minimize the effects of contact inconsistencies, ensuring stable and reliable measurements.

Installation and operating principle

The MicroPolar LB 566 is designed for inline applications, ensuring representative measurements across the entire cross-section of the product flow. Its robust design and multifrequency technology enable stable and reliable measurements that are unaffected by factors such as color, viscosity, heterogeneous composition, or salt content.

To achieve precise moisture measurement, a Berthold FlowCell is integrated directly into the butter churn. The FlowCell is EHEDG-certified and compatible with Clean-in-Place (CIP) protocols. Its antenna design has been specifically developed for high-precision dairy applications. The structure is engineered to minimize internal electromagnetic reflections and interferences, thereby maximizing measurement accuracy and repeatability. A specialized hygienic microwave cable provides a secure, contamination-free connection between the FlowCell and the LB 566 device.

The integrated antennas and FlowCell design enable complete microwave penetration of the butter flow, ensuring that measurements are representative of the entire product cross-section. This results in reliable realtime data for effective process control. The system can be easily installed on existing pipelines with minimal modifications. Operation is carried out on-site via a user-friendly interface, allowing straightforward commissioning and calibration.

If the dielectric properties of different butter varieties vary significantly, separate calibration curves can be stored for each variant. The MicroPolar LB 566 can internally store up to four distinct calibration curves. Additionally, via the serial interface, an unlimited number of calibration datasets can be uploaded to the device. Furthermore, the system can automatically switch to the appropriate calibration dataset using a simple digital control input.

System evaluation case study

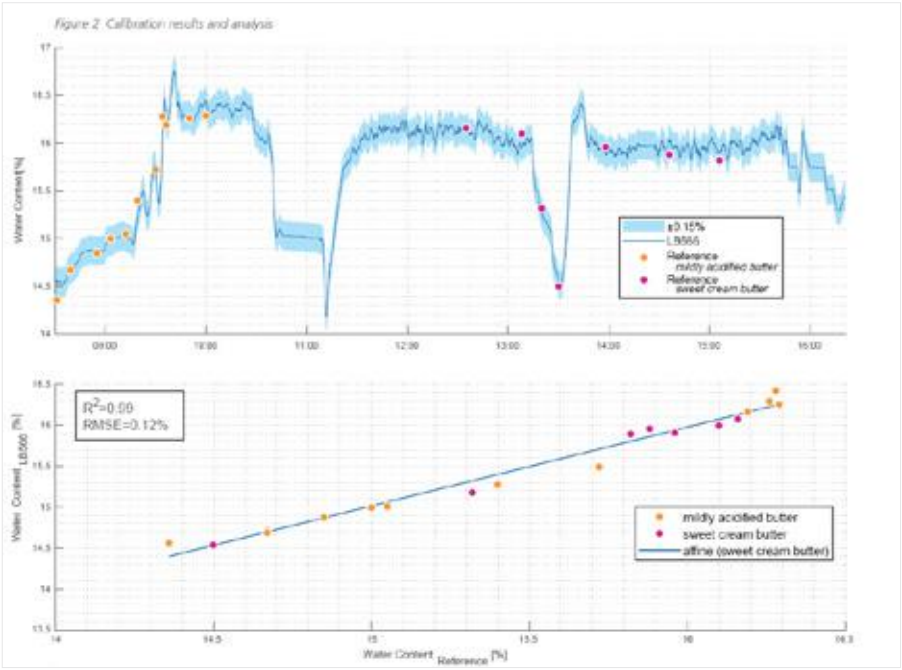
To establish a reliable calibration curve, reference measurements were conducted using a standard laboratory device (e.g., near Infrared spectroscopy) and compared with the microwave moisture values from the MicroPolar LB 566. The calibration is always

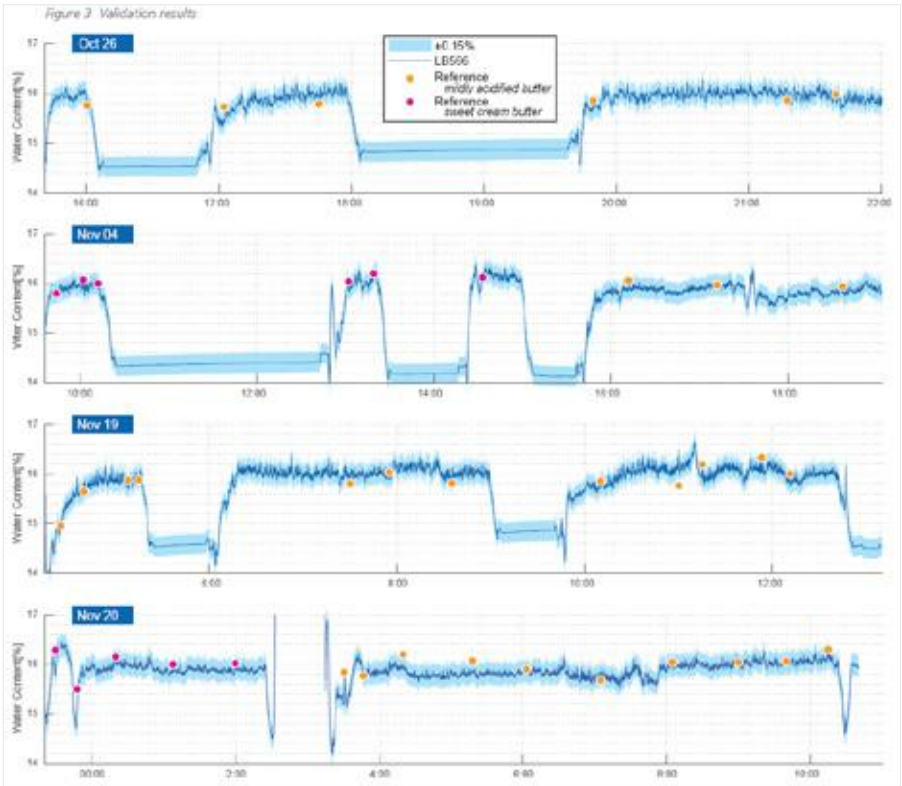
Figure 1: Quality control with the LB 566 and a DN100 FlowCell during butter production before packaging.

based on the analysis of butter samples with moisture content within the target range. In this case study, calibration was performed using both mildly acidified butter and sweet cream butter.

The lower graph (Figure 2) shows the continuous moisture measurement during the sampling of calibration specimens. The blue values represent the real-time measurements from the LB 566, while the colored points indicate the corresponding laboratory reference values. The light blue shading represents the measurement uncertainty of ±0.15%, within which nearly all reference values fall clearly, demonstrating System evaluation case study the system's high measurement stability under actual production conditions.

The lower graph presents the regression analysis of the calibration. With the high coefficient of determination (R^2 = 0.9867), an excellent correlation between the LB 566 measurement values and the laboratory reference data is demonstrated The maximum deviation is only ±0.12%, confirming that the system fully meets the typical requirements for industrial inline moisture measurement. Notably, no significant offset in measurement characteristics was observed between the two types of butter. The calibration points for both varieties align along the same regression line, indicating that slight differences in pH have no meaningful impact on measurement results. This consistency greatly facilitates the system's application across different product qualities.



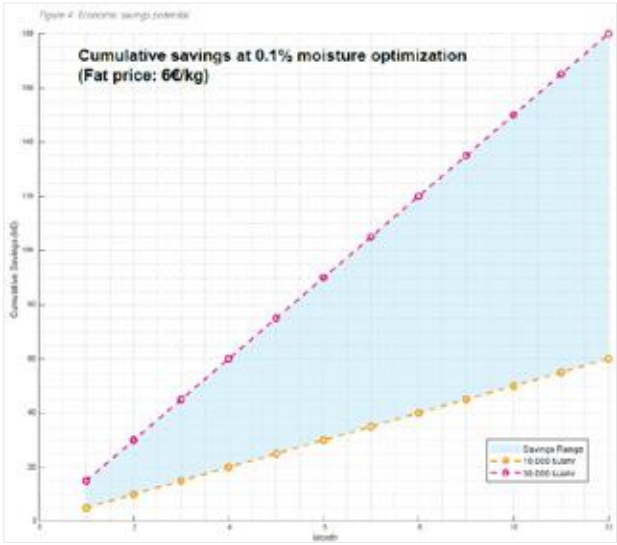


Validation of the LB 566 over several weeks

To assess long-term stability and practical suitability, the system was further validated over a period of several weeks under real production conditions. For Figure 3, measurement data from four randomly selected days were analyzed. The daily profiles include various butter batches, production pauses, water additions, and cleaning cycles. The continuous measurement curves clearly demonstrate that the MicroPolar LB 566 delivers stable and reproducible moisture values even over extended time periods. All recorded daily profiles (see Figure 3) show high reproducibility – despite interim process interruptions or variations in product characteristics.

Validation Result:

The parallel laboratory reference values fall almost entirely within the system's defined tolerance range of ±0.15%. This demonstrates that the initial calibration remains valid not only in the short term but also under varying production conditions – without the need for recalibration. Notably,



no significant drift or systematic error was observed over the course of several weeks. These results clearly indicate the high long-term stability of the measurement system.

Economic consideration

Figure 4 illustrates the cumulative savings potential achieved by optimizing moisture content by just 0.1% (equivalent to 1 kg of fat per ton) at a fat price of 6 € per kilogram. The Y-axis shows the resulting savings in thousands of euros over a 12-month period. Two production scales are considered: a smaller dairy processing 10,000 tons per year and a larger facility producing 30,000 tons annually. Even at an annual production of 10,000 tons, the savings potential amount to approximately 60,000 €. For 30,000 tons, savings can reach up to 180,000 €. Thanks to its strong return on investment, the system typically pays for itself within just a few months even for smaller dairies, often within as little as three months. This graphic highlights a key takeaway: even a minimal adjustment to moisture content can significantly increase contribution margins, underscoring the value of precise, automated moisture measurement with the MicroPolar LB 566. In addition, the MicroPolar LB 566 stands out for its durability: under standard operating conditions, a service life of 15 years is not the exception but the rule.

For further information please visit this link:

www.berthold.com/dairy

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Hugo Balcazar : Product manager for microwave systems, Berthold Technologies GmbH & Co. KG

About Berthold Technologies

As a world technology leader in the field of radiometric measuring systems, Berthold products convince with outstanding measuring performance and reliability. The main fields of application are, for example, in chemical & polymers (etc. fertilizer industry), steel and power plants, mining & mineral processing, waste & recycling, refineries, paper, glass and as well as in the food industry (etc. sugar beets). In addition, microwave measuring systems for the determination of moisture and concentration belong to our extensive portfolio. The production of high-quality measuring systems for industry and research began more than 75 years ago in Bad Wildbad in the Black Forest.

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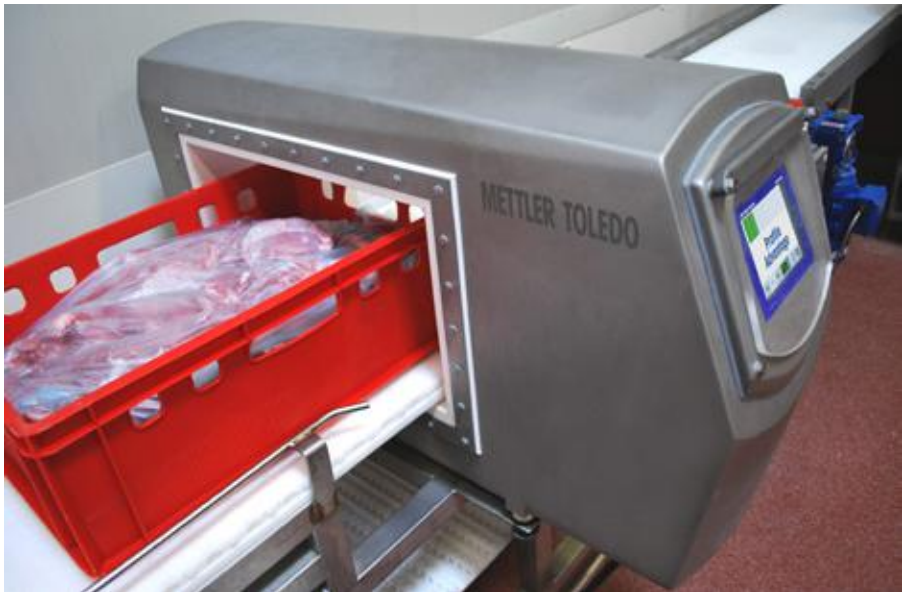
How Metal Detection is Helping Frozen Food Producers Cut Waste and Boost Productivity



Rob Stevens, Market Manager, Mettler-Toledo Safeline Metal Detection

Frozen food production is a high volume, high speed business. Pizzas, ready meals, chips and vegetables all travel quickly from processing to packing, destined for cold storage and supermarket freezers. But along this fast-paced journey, one small variable can have a big impact: temperature. As frozen products move through production lines and can begin to thaw, even slightly, their behaviour in metal detection fields can change. This often results in false rejects or a loss of sensitivity. The consequences are not just technical. They are commercial. Wasted product, rework and unnecessary downtime all hurt the bottom line.

False rejects remain one of the most persistent and expensive problems in frozen food inspection. While the products themselves may be perfectly safe, small temperature shifts alter the products signal when passing through the metal detector which can trigger unnecessary rejections. This does not reflect a fault in the metal detector but a mismatch between changing conditions and the normal inspection parameters.

Advanced metal detection systems with adaptive signal processing are changing this. Systems like the Profile Advantage from Mettler-Toledo use Multi-Simultaneous Frequency technology with multiple inspection modes and an intelligent inspection algorithm (3S) which eliminates the active product signal in real time. This enables the metal detector to maintain accurate detection sensitivity without increasing false reject rates. The result is increased brand protection, less waste, more reliability and improved productivity.

Reducing giveaway in frozen fries

One frozen French fries manufacturer faced exactly this issue. Running at a rate of one hundred packs per minute, they needed to detect all metals down to two millimetres or less while minimising false rejects to a level of less than 1 in a million. Temperature fluctuations caused by occasional line stoppages were interfering with detection levels and increasing waste.

To tackle the challenge, the manufacturer installed the Mettler-Toledo Profile Advantage metal detection system and trialled the unit over a 4-week period to assess how the technology handled signal variation. One of the Multi-Simultaneous Frequency modes proved most effective, achieving detection levels of 1.4 millimetres for ferrous, 1.8 millimetres for non-ferrous and 2.0 millimetres for stainless steel with zero false rejects.

A key factor for the customer was the system's built in histogram screen, which displays the product signal in real time. This feature helped operators visualise the product signal and track changes and respond quickly if required. The system also includes a thawing product alarm feature that triggers an alarm should signal levels move outside expected parameters, allowing the team to intervene before waste occurs.

Smarter technology for a changing environment

Frozen food production is subject to a wide range of variables. Moisture levels, packaging formats and environmental conditions all influence how products interact with metal detection equipment. Today's metal detection systems are built to manage these changes.

Automatic moisture monitoring, Multi-Simultaneous Frequency that incorporates high frequency operation and adaptive signal processing help manufacturers maintain high levels of sensitivity across varying conditions. This reduces the risk of over rejection and supports a more stable production process.

In many facilities, metal detection is integrated into a wider product inspection strategy. Combination inspection systems combine metal detection with weight verification, label checks and package integrity inspection. This provides a compact, multi-function solution well suited to frozen food lines with limited space or varied packaging formats.

Accurate reject mechanisms are also critical. Audible and visual signals guide teams to the affected product quickly, reducing the time and disruption caused by contaminant events. These systems make it easier to keep lines moving and focus interventions where they are needed.

Real world impact

Across frozen categories from bakery to vegetables, inspection control is evolving.

Metal detection is no longer just about removing risk. It is about creating a more efficient, consistent and profitable operation. Sensitivity remains important, but consistency and adaptability are now just as critical. Systems that adjust to thawing and other environmental changes without compromising performance are key to helping manufacturers stay ahead.

False rejects do more than waste product. They demand more from staff, slow down production and create unnecessary cost. Better signal processing reduces the number of good packs mistakenly rejected, supporting both yield and sustainability. Frozen lines often run multiple product types. The ability to switch quickly between settings while maintaining high performance is essential. Metal detection solutions like the Profile Advantage offer flexible setup, intuitive controls and detailed reporting tools. This supports traceability, continuous improvement and performance benchmarking across sites.

Conclusion

In an industry where margins are tight and speed is critical, the right inspection technology delivers more than compliance. It supports uptime, quality and smarter decision making. Frozen products will always be subject to temperature changes. But with adaptive metal detection, false rejects do not have to follow. This offers manufacturers a clear way to combat rising costs, boost productivity and protect brand reputation with confidence.

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Food Adulteration in India:
2025 Outbreaks, Rapid Detection, and the Role of Indigenous Innovation

Divya Panneerselvam*, Surya Priyadharsini*, Mansi Thaker* & A.G.Saranya Gayathiri*

2025: A Wake-Up Call for India's Food Safety System

The year 2025 has emerged as a defining moment for food safety in India, exposing the hidden and increasingly complex nature of food adulteration across the country. What was once perceived as sporadic dilution or visible mixing has now transformed into organized, chemically driven adulteration practices affecting everyday foods consumed by millions. Reports from multiple states revealed contamination in staples such as milk, spices, edible oils, pulses, and animal-derived foods, underscoring that adulteration is no longer limited to isolated incidents but has become a systemic public health concern.

One of the most alarming developments reported in December 2025 was the detection of nitrofuran residues and their metabolites in eggs. Nitrofurans are banned veterinary antibiotics that are illegally used in poultry farming to control infections and enhance productivity. Their misuse, particularly without observing proper withdrawal periods, leads to residues such as AOZ, AMOZ, AHD and SEM entering the food chain through eggs. These compounds are known for their carcinogenic and genotoxic potential and pose long-term health risks, especially to children and other vulnerable populations. Regulatory alerts, intensified surveillance, and product recalls following these findings clearly demonstrated that even foods traditionally considered safe and nutritious are susceptible to invisible chemical adulteration.

India's vast and diverse food supply chain is under increasing pressure due to rapid urbanization, rising demand for processed and ready-to-eat foods, and the continued dominance of informal food markets with limited oversight. Economic incentives often encourage shortcuts, making adulteration a persistent challenge despite strong regulatory frameworks under the Food Safety and Standards Act (FSS Act), 2006. What has changed in recent years is the nature of adulteration itself. There has been a clear shift from easily visible adulterants to sophisticated chemical residues, synthetic substitutes, and illegal additives that are far more difficult to detect without scientific tools.

These repeated outbreaks have fundamentally changed how food adulteration is perceived in India. It is no longer merely a quality or economic issue, it has evolved into a public health emergency, demanding rapid, accessible, and decentralized detection mechanisms alongside conventional laboratory testing.

Food Adulteration in India: The 2025 Scenario

India's vast and diverse food supply chain is under increasing pressure due to rapid urbanization, rising demand for processed and ready-to-eat foods, and the continued dominance of informal food markets with limited oversight. Economic incentives often encourage shortcuts, making adulteration a persistent challenge despite strong regulatory frameworks under the Food Safety and Standards Act (FSS Act), 2006. What has changed in recent years is the nature of adulteration itself. There has been a clear shift from easily visible adulterants to sophisticated chemical residues, synthetic substitutes, and illegal additives that are far more difficult to detect without scientific tools.

Commonly Reported Adulterants in 2025

Recent surveillance and enforcement activities during 2024–2025 have highlighted repeated adulteration across commonly consumed foods. Milk has been found adulterated with detergent, urea, starch, and even synthetic milk. Spices such as turmeric and chilli powder have shown contamination with industrial dyes like metanil yellow and Sudan dyes. Edible oils have been adulterated with argemone oil and mineral oil, while pulses have been mixed with kesari dal and synthetic colourants. Honey adulteration using sugar and rice syrups remains widespread, and paneer contamination with detergent and starch continues to be reported. In animal-derived foods, particularly eggs and poultry products, antibiotic residues such as nitrofurans have emerged as a major concern. These adulterants not only reduce nutritional value but are also linked to acute poisoning, organ toxicity, hormonal disruption, antimicrobial resistance, and chronic health conditions.

How Is Food Adulteration Detected?

Food adulteration analysis in India relies

on a two-tiered approach. Accredited food testing laboratories play a critical role by employing advanced analytical techniques such as GC-MS, LC-MS/MS, FTIR, UV–Visible spectroscopy, residue analysis, and microbiological testing. These methods offer high accuracy and legal validity, making them essential for regulatory enforcement and confirmation. However, they require sophisticated instrumentation, trained analysts, significant investment, and time.

To address the need for immediate decision-making at the field level, rapid screening tools have become increasingly important. Adulteration detection kits serve as first-level screening methods that enable quick identification of common adulterants, helping prevent unsafe food from reaching consumers before laboratory confirmation is undertaken.

Adulteration Detection Kits: Rapid Answers in Critical Moments

Adulteration detection kits are designed to provide simple, rapid, and cost-effective screening within minutes. Their importance lies in their ability to support on-the-spot decision making without the need for complex instruments or technical expertise. These kits are particularly valuable for street food vendors, food inspectors, small vendors, schools, self-help groups, and food safety awareness programs. By enabling early detection at the source, they reduce the circulation of unsafe food, complement laboratory testing, and significantly ease the burden on regulatory laboratories.

Parikshan: Strengthening India's Food Safety Ecosystem

Parikshan, a professional food testing laboratory, plays a significant role in strengthening India's food safety framework through a combination of scientific testing, capacity building, and indigenous innovation. The organization offers NABL-aligned testing services for adulteration and residues, provides technical support to enforcement agencies, and actively engages in training and awareness initiatives.

A key contribution from Parikshan is the development of its indigenous adulteration detection kits, which go beyond being mere rapid testing tools. Each kit is designed as a comprehensive awareness and demonstration package and is supplied with a user-friendly bilingual handbook in English and Hindi. This handbook enables even non-technical users to correctly perform tests and interpret results. It provides step-by-step procedures, clear guidance on colour change interpretation, and essential safety instructions. The kits cover commonly consumed foods such as tea, turmeric powder, chilli powder, sweet potato, and milk, including the detection of illegal dyes like Rhodamine B and arhar (tur dhal) powder–based applications for milk adulteration. With strong visual indicators and clear instructions, the kits are well suited for field demonstrations, food safety training, and community outreach programs.

Success Stories: Science Reaching the Field

Parikshan's innovation has translated into measurable impact:

- 2,200 adulteration detection kits developed for the Mirzapur Project
- 500 kits successfully produced to Bangalore
- Kits deployed for field testing, awareness drives and training programs

These initiatives empowered street Food Vendors (SFV) to identify adulteration early and act responsibly.

Impact of Kit Implementation and Public Health

The implementation of Parikshan's adulteration detection kits for SFV has led to early identification of unsafe food samples, improved compliance with food safety standards, enhanced consumer awareness, and faster regulatory responses. Most importantly, the widespread use of these kits has contributed to reducing the circulation of adulterated foods and fostering a culture of vigilance and accountability across the food supply chain.

The food adulteration incidents of 2025 have made one fact abundantly clear—adulteration is no longer hidden. With the right combination of robust regulations, accredited laboratories, rapid screening kits, indigenous innovation, and public awareness, it is both detectable and preventable. Parikshan's work demonstrates how science-driven, locally developed solutions can play a vital role in protecting public health, reinforcing the principle that safe food is not a privilege, but a fundamental right for every citizen.

The events of 2025 clearly demonstrate that food adulteration is no longer hidden—it is detectable, preventable, and manageable with the right tools. A strong food safety system requires:

- Robust regulations
- Accredited laboratories

- Rapid screening kits
- Indigenous innovation
- Public awareness

Parikshan's work exemplifies how science-driven solutions can protect public health, ensuring that safe food is not a privilege, but a fundamental right.

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How can Food Poisoning be Prevented?

Mahendra Pal [1]*, Carl Hermann Dino Steinmetz [2], Judit Molnar [3], Anubha Priyabandhu [4]

Abstract

Food poisoning (foodborne disease), a common yet preventable illness, continues to affect millions of people globally each year. It arises from the ingestion of food contaminated with pathogenic microorganisms (bacteria, viruses, parasites), toxins, chemicals, or foreign substances. Foodborne diseases are of public health and economic importance in developing as well as developed nations. Prevention of food poisoning requires a holistic approach that encompasses safe food production, processing, storage, and handling practices throughout the farm-to-fork continuum. This article highlights key preventive strategies and emphasizes food safety as a global public health priority. It also discusses best practices, such as proper hygiene, adequate cooking, safe storage, preventing cross-contamination, and adherence to national and international food safety regulations. Strengthening public awareness and capacity building among food handlers are crucial in reducing the burden of foodborne diseases. The establishment of food safety systems, including HACCP, GMP, and surveillance, are crucial to protect the health of the consumers.

Keywords: Consumers, Food poisoning, Food handlers, Food safety, Microbes, Public health, Surveillance

Introduction

Food poisoning, also referred to as foodborne illness, foodborne disease, is a global public health issue, which involve multiple etiologies, such as bacteria, viruses, parasites, toxins, and chemicals, and it results from consuming contaminated food or beverages (Pal and Mahendra, 2015; CDC, 2022; WHO, 2024). It can occur in sporadic as well as in epidemic form, and are observed in both sexes, all age groups and in all seasons. The food can be contaminated at any stage i.e. from farm to fork. Clinical manifestations include diarrhea, vomiting, abdominal pain, dehydration, fever, neurological symptoms, and even death in severe cases (WHO,2024). It is mentioned that infants, pregnant women, elderly persons, and immunocompromised individuals are most vulnerable high-risk groups that suffer from food poisoning (Pal and Mahendra, 2015; WHO, 2024). Laboratory help is required to know the etiology of microbial food poisoning (Pal, 2018).

It is mentioned that consumption of contaminated food is responsible to cause 600 million illnesses and 420,000 deaths each year globally (Lee and Yoon, 2021). According to the World Health Organization, one in ten people become sick due to ingestion of unsafe food annually (WHO,2024). It is stated that children below 5 years of age carry 40% of the foodborne disease burden, with 125 000 deaths each year (WHO,2024). The present communication delineates on the etiology, symptoms, and preventive measures of food poisoning.

Etiology of Microbial Food Poisoning:

Microbial food poisoning is an important cause of morbidity as well as mortality in many countries of the world. It can occur in homes, hotels, and restaurants. Various types of organisms viz. bacteria, viruses, and parasite are implicated in the etiology of food poisoning (Pal,2007; Pal and Mahendra, 2015; Pal, 2018; Bintis, 2017; Pal and Ayele, 2020; Lee and Yoon, 2021; CDC, 2022; WHO,2024).

1. Bacteria:

Numerous bacteria, such as Staphylococcus aureus, Salmonella spp., Clostridium perfringens, Escherichia coli, Campylobacter jejuni, Listeria monocytogenes, Yersinia enterocolitica, Bacillus cereus, Shigella spp. Vibrio parahaemolyticus, Aeromonas hydrophila, Arcobacter butzlari, and Cronobacter sakazakii, Clostridium difficile etc. are responsible for food poisoning in many countries of the world. Commonly encountered bacteria in food poisoning include Staphylococcus aureus, Escherichia coli, Clostridium perfringens, Campylobacter jejuni and Salmonella species.

2. Viruses:

Norovirus, rotavirus, hepatitis A, and hepatitis E etc., are some of the viruses that are associated with foodborne illnesses. The viruses are transmitted via food, water, inanimate objects, and person-to-person contact.

3. Parasites:

Several species of parasites including Entamoeba histolytica, Balantidium coli, Cryptosporidium parvum, Giardia duodenalis, Cyclospora cayetanensis, Taenia saginata, T. solium, Diphyllobothrium latum, Trichinella spiralis, Bertiella studeri, Dipylidium caninum, Hymenolepsis diminuta, D. nana, Anisakis spp., Sarcocystis spp., and others are linked with food poisoning. These parasites are transmitted through the ingestion of raw or undercooked beef, pork, wild animals meat, fish, and vegetables etc.

Clinical manifestation:

Food poisoning can manifest with diarrhea, vomiting, abdominal pain, fever, dehydration, neurological symptoms, and even death in severe cases. High-risk groups include infants, elderly persons, pregnant women, and immunocompromised individuals (Pal,2007; Pal and Mahendra, 2015; Pal, 2018; CDC, 2022; WHO,2024).

Prevention of food poisoning:

Despite technological advances and strengthened regulatory systems, food poisoning remains a global challenge due to urbanization, changing food habits, globalization of food trade, climate change, and inadequate food safety education among handlers and consumers. Effective prevention requires strict implementation of scientific principles, particularly Hazard Analysis and Critical Control Point (HACCP),

personal hygiene, and good manufacturing practices (GMP) at every stage of food handling (Pal, 2007; Pal and Mahendra, 2015; CDC, 2022; WHO, 2024).

1. Ensuring Proper Personal Hygiene

Maintaining personal hygiene is the cornerstone of food safety.

- Food handlers with skin lesions should wear nitrate gloves to ensure food safety.
- It is compulsory to wash hands thoroughly with soap and safe water for at least 20 seconds before touching food, after using the toilet, or after handling raw meat.
- It is necessary to keep the hairs covered, and nails trimmed.
- The sick persons should not be allowed to handle food.
- All the vegetables and fruits should be washed "Nim Wash" (Made in India) to washes away pesticides and germs to keep safe for human use. Twenty ml solution of Nim Wash should be added to one liter of water, and then vegetables and fruits should be soaked for 15 minutes. Later, all the vegetables and fruits must be rinsed thoroughly under clean running water.
- While travelling, it is advised to avoid salad, raw and cut fruits from outside vendors, and always drink bottled or purified water only.
- It is important to mention that proper hygiene minimizes contamination with pathogens, including E. coli, Shigella, and norovirus.

2. Preventing Cross-Contamination

Cross-contamination occurs when pathogens transfer from raw to cooked food or clean surfaces.

- It is advised to us separate cutting boards and knives for raw meat and ready-to-eat foods.
- Raw foods should be kept away from cooked or prepared foods.
- Cleaning and sanitizing all surfaces and utensils after use is required.
- Cooking food to appropriate temperatures destroys harmful organisms.
- Poultry should reach an internal temperature of 74°C.
- Ground meat should reach 71°C.
- The leftovers should be reheated to 75°C.

3. Safe Storage and Temperature Control

Temperature is critical in preventing bacterial multiplication.

- Food should be kept out of the "danger zone" (5°C–60°C), where pathogens grow rapidly.
- All perishable foods should be refrigerated below 5°C within two hours of cooking.
- It is advised to freeze the foods at –18°C.
- Avoiding thawing at room temperature; thaw instead in a refrigerator.

4. Using Safe Water and Raw Materials

Access to clean water reduces contamination risk.

- Consumers and food handlers should use potable water for washing food and cooking.
- It is advised to select fresh, unspoiled ingredients from reliable sources.
- It is recommended to avoid the consumption of raw milk or unpasteurized dairy products, which may contain some zoonotic pathogens like Brucella melitensis , Mycobacterium bovis, Listeria monocytogenese.

5. Implementing HACCP and GMP

Food industries should implement Hazard Analysis and Critical Control Point (HACCP) systems to identify and control hazards during food production. Good Manufacturing Practices (GMP) and Good Hygienic Practices (GHP) ensure systematic prevention of contamination.

6. Public Education and Awareness

The public health education for raising awareness among consumers, hotels, food vendors, cafeteria, restaurants, and street food handlers is suggested. It is stated that well-designed food safety training programs obviously will reduce outbreaks due to food poisoning. It is recommended that health authorities should promote safe food practices through media, community programs, and public health campaigns.
It is mentioned that safe food handling, proper cooking, and good hygiene practices are imperative in the prevention of foodborne illness.

Conclusion

Food poisoning, which involves diverse etiologies, remains a significant public health challenge worldwide. However, it is largely preventable through adherence to proper food safety practices. Maintaining personal hygiene, avoiding cross-contamination, cooking foods thoroughly, ensuring safe storage, and using clean water and quality ingredients are effective measures to reduce the risk of foodborne illnesses. Strengthening food safety systems, including HACCP, GMP, and regular surveillance, is essential for safeguarding consumer health. A coordinated effort involving government agencies, food industries, food handlers, and consumers is crucial to achieving a safer global food supply. Continuous education and awareness initiatives can further empower communities to prevent food poisoning and strengthen public health.

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Contribution of authors:

Both the authors contributed during the preparation of the manuscript.

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Beyond Energy Efficiency: Air-Saving Ejectors Drive Sustainability and Reduce Global Warming in Industry

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Rajesh Salunkhe, Industry Segment Manager – Schmalz India

It's always a pleasure to share our expertise and work experience with our esteemed customers on innovative vacuum automation solutions. As someone who has spent 18 years across automotive vacuum automation applications, I've seen how small innovations can transform entire industries. Today, one such innovation is reshaping Indian manufacturing: Air-Saving vacuum generators.

Walk into any automotive supplier in India today and you'll hear the same refrain: "Reduce Carbon footprints." The industry is under relentless pressure to reduce carbon footprints, and every line must deliver zero-defect quality. Yet behind the scenes, many factories still rely on legacy vacuum systems that quietly waste 70% – 90% of compressed air — the second-largest utility cost in manufacturing. This hidden inefficiency drains profits, inflates energy bills, and undermines sustainability goals.

Why Air-Saving Matters

Compressed air is expensive. Every cubic meter wasted is money lost — and emissions added. In fact, energy costs for compressed air have risen nearly 20% in the past three years. From Automotive OEMs to their Tier I and II supplier, that can mean lakhs of rupees in avoidable expenses annually.

Air-saving ejectors directly tackle this challenge. By consuming air only when needed, they cut energy costs by up to 90%. But the benefits go far beyond savings:

- Reliability in harsh Indian conditions — no electronics to fail during voltage dips or monsoon humidity.
- Zero-defect performance — stable vacuum ensures consistent quality, fewer rejects, and lower warranty costs.
- Sustainability impact — each line can reduce CO_2 emissions by over 4 tons annually, equivalent to planting 700 trees.

This isn't just about machines. It's about enabling manufacturers to stay competitive, meet government incentives, and align with global carbon neutrality targets. Industrial vacuum automation applications are depending on compressed air supply. Schmalz pneumatically and electrically operated air saving ejectors ensure 90% compressed air savings during vacuum automation cycle time.

Result:

- Less compressed air usage
- Less electrical consumption
- Reduced carbon footprint

Automotive OEM's production process — Press Shop, BIW (Body in White), paint shop and assembly lines — major vacuum automation compressed air usage is at press shop, BIW line and assembly line. Schmalz ensures to provide right products to all the vacuum automation applications, such as our 100% compressed saving ejectors – 100% pneumatically and electrically.

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Consider an automotive BIW (Body in White) line that replaced its non-air saving basic ejectors with air saving ejectors. The results were dramatic:

- Energy costs dropped from ₹35,000 to ₹13,300 per month — a 62% reduction.
- ROI was achieved in just seven months.

Across India, suppliers are discovering that air-saving ejectors don't just cut costs — they boost reliability and sustainability. Once reserved for high-volume OEMs, these systems are now accessible to mid-tier suppliers, changing the economics of small-batch manufacturing. As I often say: "Air-saving ejectors don't just save air — they change the economics of manufacturing. India's Paris Agreement commitments and OEM carbon neutrality targets make sustainability a competitive advantage. A 10-line facility can cut 43 tons of CO_2 annually — 215 tons over five years — numbers that resonate with regulators and customers alike.

Why Act Now

- OEMs demand aggressive cost reductions by 2026
- Compressed air costs keep rising
- Government PLI incentives reward efficiency

Indian manufacturing stands at a crossroads. Legacy systems drain resources, while air-saving ejectors offer a proven path to lower costs, higher reliability, and real sustainability. At Schmalz India, we invite manufacturers to schedule a free energy audit and transform their lines into models of efficiency and resilience.

Check out how we save compressed air: https://youtu.be/glh8B7QQRmQ?si=XankF9oWSGgse6xa

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Snacks and Namkeen Packaging: From Protection to Strategic Brand Power

Kaniak Banga

Introduction: Packaging as a Strategic Growth Lever

The snacks and namkeen segment is one of the most dynamic and competitive categories within the Indian food industry. From traditional savouries such as bhujia, chivda, sev, and mathri to modern extruded snacks and fusion flavours, this category caters to a vast and diverse consumer base. While taste and price continue to influence purchase decisions, packaging has emerged as a decisive factor that shapes brand perception, shelf visibility, and consumer trust. No longer limited to a protective function, packaging today plays a strategic role in product differentiation, storytelling, sustainability commitment, and consumer engagement. As consumption patterns evolve and regulatory and environmental pressures intensify, snacks and namkeen packaging is undergoing a profound transformation driven by innovation and technology.

Evolution of Snacks and Namkeen Packaging in India

Traditionally, snacks and namkeen were sold loose or packed in simple polyethylene pouches, prioritising affordability and short-term freshness. These formats offered minimal barrier protection and little scope for branding or consumer communication. As organised retail expanded and branded snacks gained popularity, packaging evolved to include printed plastic films and metallised laminates that improved shelf life and visual appeal. Over time, advancements in flexible packaging technology enabled better moisture and oxygen barriers, helping preserve crispness and flavour for longer durations.

Today, the market has progressed beyond basic flexible packs to include stand-up pouches, pillow packs with enhanced graphics, rigid plastic containers, composite canisters, and portion-controlled multi-packs. Packaging is now designed not only to protect the product but also to reflect brand positioning, cater to convenience-driven lifestyles, and comply with food safety and sustainability standards.

Packaging Design and Premiumisation in the Snacks Category

Premiumisation has become a key trend across the snacks and namkeen segment, driven by urbanisation, rising disposable incomes, and evolving consumer preferences. Packaging design plays a central role in communicating premium quality. Brands are investing in high-resolution printing, bold colour palettes, regional and cultural design elements, and premium finishes such as matte effects, gloss contrasts, and textured laminations.

Well-designed packaging enhances shelf impact and helps products stand out in crowded retail environments. For namkeen brands with deep-rooted heritage, packaging serves as a storytelling medium that blends tradition with modernity. For newer snack brands, contemporary and minimalistic designs convey innovation, health consciousness, and global appeal. Festival-specific and limited-edition packs further strengthen emotional connections with consumers while driving seasonal sales.

Barrier Protection and Shelf Life Enhancement Technologies

One of the primary functions of snacks and namkeen packaging is to preserve freshness, texture, and flavour. Fried and oil-based snacks are particularly sensitive to oxygen, moisture, and light exposure, which can lead to rancidity and loss of crispness. To address these challenges, packaging manufacturers have developed advanced multi-layer flexible laminates that offer high barrier performance.

These laminates typically combine materials such as oriented polypropylene, polyester, polyethylene, and metallised films to provide effective protection against environmental factors. Nitrogen flushing has become a standard practice in snack packaging, replacing oxygen within the pack to slow oxidation and extend shelf life without the use of chemical preservatives. This technology supports clean-label trends while maintaining product quality during

storage and transportation.

Active and Intelligent Packaging Innovations

Beyond conventional barrier solutions, active and intelligent packaging technologies are gaining traction in the snacks segment. Active packaging systems interact with the internal environment of the pack by absorbing oxygen or controlling moisture levels, thereby further extending product freshness. While still at a developing stage in India, these technologies hold promise for premium and export-oriented snack products.

Intelligent packaging, enabled through QR codes and digital markers, allows brands to connect directly with consumers. By scanning a code on the pack, consumers can access nutritional information, ingredient sourcing details, brand stories, promotional offers, and interactive content. This digital integration enhances transparency and engagement, particularly among younger, tech-savvy consumers who value information and authenticity.

Convenience-Oriented Packaging Formats

Modern consumers increasingly seek convenience in food consumption, and packaging design has adapted accordingly. Resealable closures, zip locks, tear notches, and easy-open features have become essential components of snack packaging. These features help maintain freshness after opening and allow for multiple consumption occasions, which is especially important for family-sized namkeen packs.

Portion-controlled packs and on-the-go snack formats are also gaining popularity among working professionals, students, and travellers. Multi-pack configurations offer value while catering to portion management and hygiene concerns. Packaging innovations that enhance usability contribute directly to consumer satisfaction and brand loyalty.

Sustainable Packaging as a Business Imperative

Sustainability has moved from being a niche concern to a mainstream business imperative in the snacks and namkeen industry. Growing awareness of plastic waste, environmental degradation, and climate change has significantly influenced consumer expectations and regulatory frameworks. Packaging, as one of the most visible elements of a product, is under increasing scrutiny.

Brands are actively exploring sustainable packaging solutions that reduce environmental impact while maintaining functional performance. Lightweight packaging structures help reduce material usage and transportation emissions. The shift towards recyclable mono-material laminates is gaining momentum as it simplifies recycling processes and improves waste management outcomes.

Packaging at the Heart of a High-Growth Industry
India's snacks and namkeen market is one of the most vibrant and rapidly expanding segments within the country's food sector. Increasing urbanisation, rising disposable incomes, and evolving consumer lifestyles have fuelled demand for convenient, ready-to-eat products, elevating packaged snacks to mainstream consumption. As of 2024, the Indian snacks market was valued at approximately ₹46,571 crore and is projected to surpass ₹1,01,811 crore by 2033, exhibiting a strong compound annual growth rate (CAGR) above 8.6 percent. This growth reflects changing consumption dynamics and the increasing shift from unorganised, loose snacks to hygienically packaged, branded options.
Business Standard

Use of Recyclable, Biodegradable, and Compostable Materials

Packaging material innovation is at the heart of sustainability efforts. Several brands are transitioning to recyclable plastic films that are compatible with existing recycling streams. Clear recycling instructions printed on packs help guide consumers toward responsible disposal.

Biodegradable and compostable materials derived from renewable resources are also being explored, particularly for premium and niche snack segments. Materials such as cellulose-based films and bio-polymers offer an alternative to conventional plastics, although challenges related to cost, scalability, and composting infrastructure remain. Despite these limitations, consumer interest in environmentally responsible packaging continues to grow, encouraging further research and investment.

Refill, Reuse, and Circular Economy Models

The concept of a circular economy is gradually influencing snack packaging strategies. Reusable and refillable packaging models are emerging in urban and environmentally conscious markets. Bulk dispensing and refill stations allow consumers to purchase snacks using reusable containers, significantly reducing single-use packaging waste.

While such models are currently limited in scale, they signal a shift toward alternative consumption patterns that prioritise waste reduction and resource efficiency. Brands that experiment with reuse and refill concepts position themselves as sustainability leaders and gain goodwill among eco-conscious consumers.

Changing Consumer Expectations and Transparency Demands

Today's snack consumers are informed, aware, and values-driven. They expect transparency regarding ingredients, nutritional content, sourcing practices, and environmental impact. Packaging serves as a critical communication tool that conveys this information clearly and credibly.

Front-of-pack labelling that highlights key nutritional attributes, along with detailed back-of-pack information, helps consumers make informed choices. Sustainability claims must be authentic and substantiated, as consumers are increasingly sceptical of greenwashing. Trust and credibility are built through consistent messaging, third-party certifications, and open communication.

The Role of Digitalisation and Future Technologies

The future of snacks and namkeen packaging is increasingly being shaped by the deeper integration of digitalisation across the value chain, transforming packaging from a passive protective layer into an active information and engagement platform. Blockchain-based traceability systems are gaining attention as a powerful tool to enhance transparency and trust, enabling brands to verify ingredient origins, processing methods, and ethical sourcing practices. For consumers who are becoming more conscious about food safety, authenticity, and sustainability, such systems offer reassurance by providing verifiable data on where and how their snacks are produced. In parallel, the rise of internet-enabled and smart packaging solutions is opening new possibilities for real-time monitoring of product conditions during storage and transportation. Sensors embedded in packaging can track temperature, humidity, and handling, helping manufacturers and distributors

maintain optimal conditions, reduce spoilage, and ensure consistent quality and safety until the product reaches the consumer.

As data analytics, artificial intelligence, and automation continue to advance, packaging design and production processes are expected to become more efficient, flexible, and market-responsive. Digital printing technologies, supported by real-time consumer data, allow brands to experiment with shorter production runs, personalised packaging, and rapid design changes aligned with regional preferences or seasonal demand. Automation in packaging lines not only improves speed and accuracy but also reduces material wastage and energy consumption, supporting both cost efficiency and sustainability goals. When combined with innovations in recyclable and bio-based materials, digitalisation enables packaging solutions that are smarter, more sustainable, and more adaptable to evolving regulatory and consumer expectations. This convergence of sustainability and smart technology is set to define the next phase of packaging evolution, positioning packaging as a strategic asset rather than a functional necessity.

Conclusion: Packaging as a Catalyst for Competitive Advantage

Snacks and namkeen packaging has evolved into a powerful interface between brands and consumers, serving as a critical touchpoint that balances functionality, visual appeal, sustainability, and technological innovation. In a market characterised by intense competition, price sensitivity, and rapidly shifting consumer preferences, packaging plays a decisive role in influencing purchase decisions and shaping brand perception. Beyond preserving freshness and flavour, modern packaging communicates brand values, quality assurance, and environmental responsibility, making it an essential tool for differentiation in crowded retail environments.

Brands that proactively invest in advanced packaging technologies, sustainable materials, and consumer-centric design strategies will be better positioned to build trust, loyalty, and long-term market relevance. As regulatory pressures increase and consumers demand greater transparency and accountability, packaging will continue to act as a bridge between manufacturers and end users, delivering not just convenience but confidence. The continued evolution of snacks and namkeen packaging underscores its role as a catalyst for competitive advantage, capable of driving efficiency across the supply chain while creating meaningful and engaging brand experiences. When thoughtfully designed and strategically implemented, the humble snack pack has the potential to generate lasting impact across the entire food value chain, reinforcing trust, responsibility, and innovation at every stage.

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On-the-Go Food Packaging Market Expands as Rising Demand for Convenience and Sustainable Solutions

The global on-the-go food packaging market is entering a phase of rapid expansion, fueled by dynamic shifts in consumer behavior, sustainability trends, and technological progress in the packaging industry. As lifestyles become increasingly fast-paced and consumers prioritize convenience without compromising on quality or environmental responsibility, manufacturers are innovating to deliver packaging solutions that are portable, safe, and eco-friendly.

According to a recent report by Fact.MR, the market is forecast to grow from USD 2.24 billion in 2025 to approximately USD 4.33 billion by 2035, reflecting a CAGR of 6.8% over the period. This growth underscores a strong market transformation driven by a combination of urbanization, growing demand for ready-to-eat meals, and advancements in sustainable materials and packaging technologies.

Understanding On-the-Go Food Packaging:

On-the-go food packaging refers to materials and solutions designed to protect and preserve food that is consumed outside traditional dining spaces. This includes snack boxes, wraps, pouches, cups, trays, and clamshell containers that are designed for portability, durability, and minimal waste.

The market caters primarily to quick-service restaurants (QSRs), café chains, bakeries, food trucks, vending services, and e-commerce food delivery platforms such as Zomato, Swiggy, Uber Eats, and DoorDash. Packaging solutions in this sector not only focus on functionality and ease of use but are also evolving to meet global sustainability goals through innovations like biodegradable materials, reusable packaging formats, and recyclable coatings.
Key Market Drivers:

1. Rising Urbanization and Lifestyle Changes

The global population is rapidly urbanizing, leading to time-constrained consumers seeking convenient, ready-to-eat meal options. Urban professionals, students, and travelers are increasingly relying on packaged foods that can be consumed anytime, anywhere driving consistent demand for reliable and attractive on-the-go packaging.

2. Growth of Food Delivery and Takeaway Services

The surge in online food ordering, accelerated by digital platforms, has created enormous demand for packaging that ensures product integrity, temperature control, and spill resistance during transit. Packaging that maintains freshness while minimizing environmental impact is now seen as essential for brand reputation and customer satisfaction.

3. Environmental Awareness and Regulatory Shifts

Governments and regulatory agencies across North America, Europe, and Asia are tightening restrictions on single-use plastics, encouraging the adoption of biodegradable, recyclable, and compostable packaging. Companies are increasingly investing in circular economy practices, aligning with initiatives like the EU Green Deal and Extended Producer Responsibility (EPR) programs.

4. Technological Advancements in Packaging Materials

Breakthroughs in materials science are giving rise to plant-based polymers, cellulose films, and barrier coatings that provide superior protection and shelf life. These innovations also address issues such as leakage, odor retention, and insulation, making them ideal for on-the-go consumption.

Regional Market Insights:

North America

North America remains a dominant market for on-the-go packaging, driven by a well-established QSR network, high disposable incomes, and widespread environmental consciousness. The United States, in particular, is witnessing strong adoption of recyclable PET containers and paper-based alternatives for food and beverages.

Europe

In Europe, eco-friendly materials are the cornerstone of market expansion. Stringent EU regulations banning non-recyclable plastics and the growing consumer emphasis on sustainable lifestyles are motivating companies to innovate in biodegradable fiber-based packaging and compostable takeaway solutions.

Asia Pacific

Asia Pacific is emerging as the fastest-growing regional market, propelled by massive growth in online food delivery, increasing urban populations, and rising

incomes. Markets like India, China, Japan, and South Korea are witnessing significant demand for flexible packaging formats such as pouches and trays made from renewable resources. Additionally, local governments are launching sustainability campaigns to promote responsible consumption and waste management.

Latin America and the Middle East & Africa (MEA)

Both regions are showing steady growth, supported by expanding retail networks and rising awareness about food hygiene and sustainability. Local manufacturers are increasingly investing in paperboard and molded fiber packaging, particularly for fast-food and beverage applications.

Competitive Landscape

The global on-the-go food packaging market is highly fragmented yet competitive, with leading companies focusing on R&D, material innovation, and sustainability-driven product differentiation. Strategic collaborations, mergers, and acquisitions are frequent as companies strive to expand their geographic presence and technological capabilities.

Other Key Players Include:

Amcor Limited; Mondi Group; Sonoco Products Company; Bemis Company Inc.; Smurfit Kappa Group PLC; Huhtamäki Oyj; Sealed Air Corporation; Georgia-Pacific LLC; Berry Plastic Group, Inc.; Constantia Flexibles Group GmbH; Ball Corporation; Crown Holdings, Inc.; WestRock Company; Packaging Corporation of America (PCA); and Tetra Pak. These companies are focusing on lightweight, cost-effective, and recyclable packaging materials to cater to the evolving demands of both foodservice providers and consumers.

Future Outlook:

The on-the-go food packaging market is set for substantial transformation as sustainability becomes central to every aspect of product design and production. Industry players that successfully merge eco-friendly innovation, material efficiency, and convenience will gain a strong competitive edge.

Emerging technologies such as smart packaging with QR codes for traceability, biodegradable coatings for shelf-life extension, and nanotechnology for enhanced barrier performance are likely to redefine how food is packaged and consumed in the future.

Recent Industry Developments:

- Amcor Limited has launched recyclable flexible packaging tailored for fast-food and ready-meal categories, combining sustainability with high-barrier performance.
- Smurfit Kappa Group expanded its range of paper-based containers and fiber trays for beverages and snacks, emphasizing circular design principles.
- Huhtamäki Oyj continues to invest in compostable and bio-based solutions, enhancing its portfolio to serve the growing segment of environmentally conscious food brands.
- Berry Global has introduced lightweight plastic alternatives with improved recyclability and reduced carbon footprints.

With consumers increasingly expecting their food packaging to reflect their environmental values, and governments pushing for waste reduction targets, the sector offers tremendous economic and ecological potential. As the boundaries between sustainability and convenience blur, the on-the-go food packaging industry is positioned to play a crucial role in shaping the future of global food consumption.

These insights are based on a report on On the go Food Packaging Market by Fact.MR.

The new LEAK-MASTER® MAPMAX for inline leak testing

100% leak-proof packaging

Packaging must be leak-proof – without exception. Even a single leak can lead to spoilage, returns and a loss of trust. With the LEAK-MASTER® MAPMAX from WITT, food producers can ensure the quality of their packaging and thus their products: every package is tested inline – fully automatically, non-destructively and reliably.

Safety for the entire production process – directly on the line

The MAPMAX tests individual packages, complete sets, outer packaging or cartons on the packaging line – quickly and without contact. The CO_2-based test in a vacuum chamber detects even the smallest leaks from approx. 20 micrometres. Depending on the relevant leak size, CO_2 content in the packaging and other environmental parameters, a testing speed of up to 15 test cycles per minute is possible. This combination of sensitivity and speed makes the system unique and powerful enough to test the entire production output. Food producers thus achieve maximum safety and can give their customers a promise of quality.

Reliable technology – optimised for practical use

A vacuum creates a pressure difference that causes CO_2 to escape from leaky packaging. The flow-optimised machine design directs the gas to highly sensitive infrared sensors with a resolution of 1 ppm in a fraction of a second. This ensures that every leaky package is detected before it reaches the customer.

The test is non-destructive. This means no rejects, no repackaging, no additional costs. In the event of a leak, the system communicates with downstream systems via potential-free contacts – for example, to trigger an alarm or activate an ejection system.

New design, easy to use

The current generation of MAPMAX has been specifically redesigned: the transparent acrylic glass design improves visibility of the process, the slimmer design saves space, and the optimised construction facilitates servicing during operation. Operation is intuitive via a touch display, and presets can be quickly called up or individually adjusted. An Ethernet interface is available for digital quality assurance.

Proven, improved – and unique in performance and precision

The LEAK-MASTER® MAPMAX has proven itself over many years as a reliable inline system for leak testing. With the latest update, it now offers even greater practicality – while maintaining the same high level of testing accuracy. The unique combination of speed and sensitivity makes it the ideal solution for inline testing of entire cases, cartons or individual packages. This gives food producers maximum security: to protect their products, comply with delivery contracts and ensure customer satisfaction.

www.wittgas.com

Poland dairy 'Polmlek' filling new ESL and Aseptic (low acid) dairy products and desserts in spouted pouches

The market for spouted pouches continues to grow rapidly. They are extremely easy for consumers to handle and manufacturers benefit from lower storage space compared e.g. with preformed cups. Polmlek was looking for a new packaging for the launch of its' new low acid dairy products and desserts. IMA Fillshape is the only company worldwide able to supply the unique technology of a spouted pouch, aseptic, high speed rotary filling machine for high and low acid products.

These are the reasons why Polands's dairy company has chosen this consumer-friendly packaging for its' new products. The pouch filler Ermetika Aseptic EAS240 is a continuous motion rotary filler with a capacity of 240 pouches per minute. The machine works with premade pouches, spouts and caps.

Spouted pouches are assembled at the welding carrousel and then sterilized internally and externally by means of VHP (Vaporized Hydrogen Peroxide). Caps are sterilized by means of VHP and applied after the filling is complete. Filling and capping are performed in the sterile isolator area. The machine features dedicated skids for the VHP preparation and for the chemicals preparation for cleaning and sterilization cycles (CIP-COP and SIP-SOP).

The brand new dairy products Pomlek Homogenized cheese strawberry, Pomlek Prebiotic on strawberry and desserts such as Pomlek Nut and Chocolate milk dessert, Pomlek Poezja LUX Strawberry flavored dessert are filled into spouted pouches. The machine allows the customer to produce: ESL products (Extended Shelf Life) by cold distribution chain for a shelf life up to 60 days and products in Full Aseptic mode for High 2 Acid and Low Acid products: for a shelf life at ambient temperature for 6-12 months.

The practical pouches are an ideal solution for offices, hotels, cafés, fast-food chains, trains and buses as well as on-the-go.

"We are very satisfied with this state-of-the art pouch machine. " reported Monika Białobrzewska, Vice President Mazowiecka Spółka Mleczarska. „The inauguration of the new aseptic production line is a great milestone for Polmlek. The first spouted pouch aseptic rotary filler in Poland,

Official opening: ribbon cuttening of the aseptic pouch filler Ermetika Aseptic EAS240 in October 2025. From left to right: Andrzej Grabowski (Polmlek Co-founder/Owner), Enzo Bocelli (Sales Manager IMA FILLSHAPE), Jerzy Borucki (Polmlek Co-founder/ Owner)

Portfolio of the new products filled on the Ermetika Aseptic EAS240

From left to right: Andrzej Grabowski (Polmlek Co-founder/Owner), Monika Białobrzewska (Mazowiecka Spółka Mleczarska SA Vice President), Enzo Bocelli (Sales Manager IMA FILLSHAPE), Bogdan Wójcik (FORMA President – IMA FILLSHAPE agent for Poland), Jerzy Borucki (Polmlek Co-founder/Owner)

gives us a step ahead to our competitors, introducing in the market brand new ESL and Aseptic (low acid) dairy products and desserts."

Polmlek Group is the leader of the Polish dairy industry – the largest private company in the sector, built entirely on domestic capital. For over 30 years, it has been setting the standards for quality, innovation, and development. With 15 modern production facilities, over 5,000 employees, unique recipes, advanced technologies, a robust logistics network, and a presence in international markets, Polmlek stands on solid foundations – a brand that combines tradition with the future.

About IMA Fillshape

IMA Fillshape, based in Parma/Italy designs and manufactures pouch making and filling machines for flexible stand-up pouches - with and without spout – and doypacks for dairy, food, beverage and personal care sectors with more than 100 employees.

About IMA DAIRY & FOOD

IMA DAIRY & FOOD is one of the world's leading suppliers of packaging machinery, technology and services and has extensive know-how in the key industries of dairy and food products. Based in Ranstadt, Germany, the holding company currently represents 5 production locations in Europe as well as numerous sales and service companies. IMA DAIRY & FOOD employs a workforce of more than 550 worldwide.

www.ima.it/foodanddairy

Asia's New Sweet Standard: What Consumers Will Demand in 2026

By Christian Philippsen, Managing Director, BENEO Asia

If 2025 taught the industry anything, it's that Asian consumers have reset their expectations around sweetness. Reduced-sugar products are no longer seen as niche or "better-for-you" alternatives; they are rapidly becoming the default choice for everyday treats, moving from a separate "healthier choices" shelf to the more mainstream one in grocery stores. Yet, this change comes with a sharper expectation: healthier products must not feel like healthier substitutes. They must still deliver the same comfort, pleasure, and sensory cues people associate with a treat.

Manufacturers now face a clear message from the market: as the industry moves into 2026 and beyond, success will not be defined merely by how much sugar is removed, but by how faithfully brands can recreate the joy that sweetness brings. This is where the challenge and opportunity lie. Ultimately, the differentiation will come from the ingredients that enable this — particularly those capable of mimicking sugar's technical behaviour, not just its sweetness.

A Recalibration: Healthier Treats Becoming the Default

Across the APAC region, consumers are redefining what indulgence means. Rising rates of diabetes and metabolic disease[1] have prompted many to rethink their sugar consumption, yet our desire for enjoyment hasn't diminished. This is reflected in the numbers: the region's reduced-sugar category now stands at US$11.6 billion and is forecasted to almost double to US$22.7 billion by 2030, fuelled by a 10% CAGR[2].

A decade ago, such growth would have seemed unlikely. Today, it is simply a response to evolving behaviour, with consumers becoming far more intentional about what they buy. Nearly half of global consumers (47%)[3] now research the health benefits of ingredients before choosing snacks, signalling a more deliberate, informed approach to everyday eating. But this shift is not only about nutrition. It is about trust. Consumers expect "reduced sugar" to be an invisible improvement, not a compromise they can taste.

When the Sweetness Disappears: The Challenge for Manufacturers

Anyone who has worked in food manufacturing or product development knows that sugar is far more than a sweetener. It provides structure, mouthfeel, gloss, colour, stability, and reliable behaviour during processing. Take it away and the entire consumer experience changes.

This is why early generations of reduced-sugar products struggled. Chocolate turned chalky. Hard candies became sticky in humid Asian climates. Gum pellets chipped during packing. Coatings lost their shine. Consumers accepted these flaws for a time because options were limited, but those days are behind us. With today's shopper seeing that healthier versions can be indistinguishable from the original, expectations have increased and this demand is reshaping the technical landscape.

In many ways, the reformulation challenge has shifted from "cutting sugar" to "engineering delight." Manufacturers are now redesigning recipes not just for nutritional improvement but for emotional fidelity as well — ensuring the reduced-sugar version delivers the same bite, melt, texture, aroma, and finish as the original.

The Quiet Enabler: How Isomalt Bridges Health and Indulgence

Meeting these heightened expectations requires more than reducing sugar; it demands ingredients that can replicate sugar's functionality. This is where functional carbohydrates like Isomalt have become indispensable. Derived from natural sugar beet, Isomalt offers sugar-like sweetness at half the calories and delivers a very low glycaemic response, making it a strong fit for consumers seeking a more balanced diet and blood sugar management.

Its technical performance, however, is what makes Isomalt a game-changer. It closely mimics sugar in functionality, a rarity in the world of alternative carbohydrates. Using Isomalt:

- Chocolate retains a natural snap without the cooling effect associated with many other polyols.
- Ice cream can achieve a 30% sugar reduction while maintaining creamy indulgence and enabling stronger front-of-pack claims.
- Hard candies benefit from Isomalt's low hygroscopicity, preventing

stickiness and supporting brilliantly translucent colours.

- Gum and coated products see improved machinability, stronger core stability, faster coating, and significantly reduced scrappage — key advantages for Asia's high-volume production lines.

In short: Isomalt does not just allow manufacturers to remove sugar. It allows them to preserve joy at scale, consistently, and without compromise.

Where Asia's Sweetness is Heading Next

Asia's new sweet reality sets a clear benchmark for 2026: If it doesn't taste and feel like the real thing, consumers simply will not settle for it.

Looking ahead, one theme stands out: the region is not moving toward "less sweetness," but toward smarter sweetness. Consumers expect healthier choices to be seamlessly integrated into their daily lives, not labelled as sacrifices. As awareness of metabolic health deepens, this expectation will only strengthen.

For manufacturers, this represents both a pressure and a generational opportunity. Reformulation is no longer a defensive move but a strategic advantage — one that can differentiate brands, unlock new product formats, and meet the region's rapidly evolving definition of wellness. Those who invest in functional ingredients, prioritise sensory excellence, and approach reformulation as a creative challenge, rather than a restriction, will be best positioned to lead the next wave of innovation.

In 2026, sweetness will not simply be tasted — it will be judged on how well it aligns with a healthier, more discerning Asia. The brands that embrace this transformation early, supported by ingredients like Isomalt, will shape the region's next chapter in indulgence.

[1] GBD 2021 Diabetes Collaborators. (2023). Global, regional, and national burden of diabetes from 1990 to 2021, with projections of prevalence to 2050: a systematic analysis for the Global Burden of Disease Study 2021. The Lancet, 402(10397). https://doi.org/10.1016/s0140-6736(23)01301-6

[2] https://www.grandviewresearch.com/horizon/outlook/reduced-sugar-food-beverages-market/asia-pacific

[3] FMCG Gurus Top Trend 7 Report 2020: Snacking Reclassified Explored

Fruit Powders as Ingredients and Their Application in Bakery Products

The global bakery industry is witnessing a strong shift toward clean-label, functional, and naturally flavored products. In this evolving landscape, fruit powders have emerged as versatile and high-value ingredients that cater to consumer demand for natural taste, nutrition, and visual appeal. Derived from fresh fruits through drying and milling processes, fruit powders retain much of the fruit's natural color, flavor, and nutritional profile, making them ideal for a wide range of bakery applications.

Fruit powders are produced using techniques such as spray drying, freeze drying, or drum drying, each influencing the final product's flavor intensity, solubility, and nutrient retention. Common fruit powders used in bakery include apple, banana, strawberry, mango, blueberry, raspberry, citrus, and pineapple. These powders are rich in vitamins, antioxidants, dietary fiber, and natural sugars, offering both functional and nutritional benefits.

One of the primary advantages of fruit powders in bakery formulations is their ability to deliver natural flavor without the need for artificial additives. Bakers use fruit powders to impart authentic fruit taste in cakes, muffins, cookies, pastries, and bread. Unlike fresh fruit, powders offer consistent flavor, longer shelf life, and easier handling, making them suitable for industrial-scale production. They also eliminate concerns related to moisture imbalance, microbial spoilage, and seasonal availability.

Fruit powders play a significant role in enhancing the nutritional profile of bakery products. Apple and citrus powders contribute soluble fiber, improving digestive health, while berry powders are known for their high antioxidant content. Banana powder adds natural sweetness and potassium, reducing the need for refined sugar. As consumers increasingly seek healthier indulgence, fruit powders support the development of better-for-you bakery products with added functional benefits.

Color enhancement is another important application of fruit powders in bakery. Natural pigments from fruits such as beetroot, strawberry, blueberry, and mango provide vibrant hues to baked goods without synthetic colorants. This is particularly valuable in premium, artisanal, and children-focused bakery products where visual appeal is critical. Fruit powders are also widely used in icings, fillings, glazes, and frostings to create naturally colored and flavored components.

In gluten-free and plant-based bakery formulations, fruit powders serve multiple functions. They improve mouthfeel, add structure, and enhance flavor in the absence of traditional ingredients like eggs or dairy. Fruit powders also complement alternative flours such as almond, oat, or millet, aligning well with current trends in specialty bakery products.

Furthermore, fruit powders support sustainability and food waste reduction. They are often produced from surplus or cosmetically imperfect fruits that are unsuitable for fresh retail, converting potential waste into value-added ingredients. This aligns with the bakery industry's growing focus on sustainable sourcing and circular economy practices.

In conclusion, fruit powders are transforming bakery innovation by offering natural flavor, nutrition, color, and functional benefits. Their ease of use, extended shelf life, and compatibility with clean-label and health-driven trends make them indispensable ingredients in modern bakery applications. As consumer demand for natural and functional baked goods continues to rise, fruit powders are set to play an increasingly important role in shaping the future of the bakery industry.

Transforming Banana and their Biomass : A Nature's Gift into Next-Gen Products with Profit and Business

Suresh Kumar. P[1]*, Birundha.M[2] , Pushpavalli, S.[2], Nayana C[2]

Introduction

In an era of sustainability with profit and business, banana is stepping into the spotlight not just as a delicious fruit but as a symbol of innovation and resourcefulness. Once limited to breakfast tables and snack boxes, bananas are now finding their in food industries, being reborn as high-value, shelf-stable products. The banana plant is a marvel of nature's resourcefulness. Every part serves a purpose, leaving nothing to waste. What was once considered agricultural residue is now turning into a goldmine of innovation. The pseudostem, blossom, leaves, rhizome and scutcher, often discarded after harvest, are emerging as rich sources of dietary fibre, finding their way into fibre-enriched bakery products and biodegradable materials. The banana peel, long overlooked, is considered as a nutritional powerhouse loaded with antioxidants, minerals, and fibre, inspiring the development of health-boosting powders, snacks, and other functional foods. The rhizome, often forgotten, is proving to be a hidden gem brimming with bioactive compounds and functional ingredients that open new possibilities for novel food formulations and nutraceuticals. Meanwhile, the banana flowers and stem juice are earning recognition for their therapeutic and health-promoting benefits.

Banana fibre extracted from the stem is revolutionizing the textile and biopolymer industries, while the leaves are being rediscovered as sustainable material, replacing plastic with natural food packaging and eco-plates. Truly, the banana plant stands as a shining example of "residues to revenues," where nature and innovation go hand in hand. Considering the importance, ICAR- National Research Centre for Banana, Tamil Nadu continuously working on banana value addition and nutraceuticals, moving from primary processing to tertiary processing and secondary agriculture, has developed more than 50 technologies and commercialized the technologies to more than 130 entrepreneurs over the period of five years. Other than conventional technologies like banana flour, baby food, stem and flower pickles, institute focus on high value technologies coping up with the recent trends of smart food and personalized nutrition.

Banana Rhizome: The Hidden Treasure Beneath the Soil

The banana rhizome is a thick, fleshy underground stem is the heart of the banana plant, from which new shoots and roots emerge. Traditionally, farmers focus on the fruit and pseudostem, while the rhizome is often left behind as agricultural waste. But recent innovations are changing this perspective, turning this forgotten part into a nutrient-rich, sustainable ingredient for food applications. The banana rhizome is a rich source of dietary fibre, starch, minerals, and bioactive compounds, making it a promising raw material for functional foods. In several traditional medicine systems, it is valued for its detoxifying, diuretic, and blood-purifying properties. Beyond health benefits, its natural fibre content supports digestive health and can be incorporated into modern wellness diets. Recognizing its potential, we have developed an innovative banana rhizome rusk - a crispy, golden, and nutritious snack that gives a new life to what was once an agricultural residue.

By processing the rhizome into fine flour and blending it with conventional baking ingredients, this rusk offers enhanced fibre, texture, and unique earthy flavour, appealing to health-conscious consumers and sustainability enthusiasts alike. Similarly, fibre-rich extruded products are made using banana rhizome as an ingredient. The market potential for such products is on the rise. With the global biodegradable and upcycled food market valued at over USD 60 billion and growing annually, there's strong consumer demand for eco-friendly, high-fibre, and plant-based snacks.

Crafting Eco-Friendly Hydrogels using banana waste

Hydrogels are soft, jelly-like materials capable of absorbing and retaining large amounts of water while maintaining their structure. Traditionally, these materials have been produced from synthetic polymers derived from petroleum sources. Natural starch/cellulose based hydrogels have emerged as a solution - renewable, safe, and biodegradable, offering a promising substitute for conventional synthetic materials.

Banana starch, often underutilized and derived from non-commercial or waste bananas, serves as a rich source of amylose and amylopectin, making it an excellent candidate for hydrogel formation. When cross-linked with citric acid, the starch forms a stable, flexible, and pH-responsive material. This simple, chemical-free modification significantly enhances its water absorption, swelling capacity, and mechanical strength, all

while remaining non-toxic and eco-friendly. Nanocellulose-based hydrogels form strong, water-retaining 3D networks using renewable cellulose nanofibers. Their biocompatibility, tunable porosity and swelling behaviour make them suitable for advanced biomedical uses like wound dressings and drug delivery. They can also be functionalized with nanoparticles for antimicrobial or smart-responsive performance. The applications of banana starch-based hydrogels are vast and diverse.

In the biomedical field, they are used in wound dressings, drug delivery systems, and tissue engineering scaffolds because of their biocompatible nature. The food industry benefits from their role as natural thickening agents, freshness retainers, and carriers for active ingredients. In cosmetics, they serve as natural moisturizers and carriers for active skin-care compounds, while in packaging, they offer a biodegradable alternative to harmful plastic coatings.

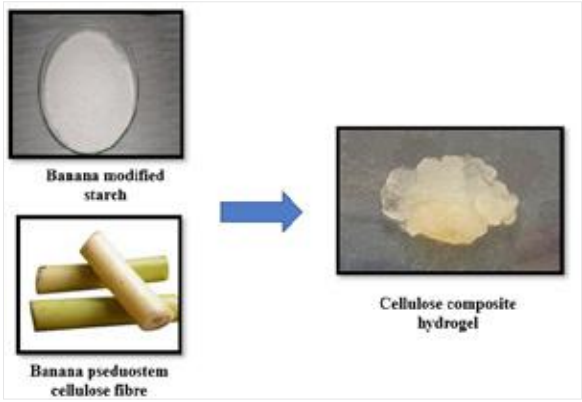
Dietary fibre from Banana pseudostem scutcher

Every year, approximately 300–350 million metric tons of banana biomass are wasted worldwide after the harvest of bunches. Among these residues, the scutcher, a pulpy biomass left after fibre extraction from the pseudostem, accounts for 30 to 35 per cent of the total weight of the banana plant, resulting in nearly 10–12 million tons per hectare on a dry weight basis. It is now a source of two remarkable bio-based products: xylitol and dietary fibre. At ICAR–NRCB, we have now extracted dietary fibre from the banana scutcher. This fibre is not just rich in nutritional components, but also exhibits excellent water and oil holding capacities, glucose adsorption ability, and cholesterol-lowering potential. Such functional properties make it a perfect ingredient for incorporating into bakery products, snacks, and health foods, enhancing both their nutritional and textural qualities. With global demand for dietary fibres rising rapidly, valued at multibillion-dollar markets, banana pseudostem scutcher may soon emerge as a promising material in the drive toward zero-waste, sustainable industries

Banana peel enriched bakery products

Often discarded as waste, the banana peel is a hidden powerhouse of nutrition and sustainability. Rich in dietary fibre, antioxidants, and essential minerals, it holds immense potential for creating functional and eco-friendly foods. By transforming banana peels into valuable ingredients like powders or extracts, we not only enhance health but also promote a zero-waste approach.

Incorporating banana peel powder into muffin formulations boosts fibre content and also improves moisture retention, colour, and shelf life. These muffins offer a satisfying bite with natural banana flavour, all while reducing food waste. Beyond their soft texture and appealing taste, these muffins contribute to better digestive health.



Transforming pseudostem Scutcher into Xylitol

Xylitol is a naturally occurring five-carbon sugar alcohol widely recognized for its low-calorie sweetness, dental-friendly properties and suitability as a sugar substitute in diabetic and functional food applications. The global xylitol market is projected to reach between USD 776.1 million and USD 1.43 billion by 2025, reflecting the growing demand for natural and healthier sweeteners. In India, the retail price of xylitol is approximately ₹325 per kilogram for an industrial-grade supply. Xylitol was successfully produced from banana pseudostem scutcher waste, an abundant yet underutilized byproduct of banana fiber extraction, thereby transforming agricultural residue into a value-added bioproduct. Through microbial valorization using Candida tropicalis, the hemicellulosic sugars present in the biomass were bioconverted into xylitol. This eco-friendly approach not only enhances waste management but also supports the circular bioeconomy by promoting resource recovery and value addition. The produced xylitol has been successfully utilized in the preparation of jellies and gummies as a natural sugar substitute, demonstrating its potential in the development of health-oriented and sustainable food products.

Xylitol-Enriched Banana Gummies

Banana stem juice-based gummies enriched with xylitol were developed as a healthy and innovative alternative to conventional sweets. These gummies combine the natural nutrients of banana stem juice with the functional benefits of xylitol, for its pleasant cooling taste and health-promoting properties.

Xylitol not only provides sweetness without added sugar but also helps prevent dental cavities, supports blood sugar management, and is low in calories, making the gummies suitable for children, diabetics, and health-conscious consumers. The inclusion of banana stem juice adds a refreshing and nutrient-rich twist, contributing potassium, dietary fibre, and antioxidants that enhance the nutritional value.

Reconstituted Ripe Banana powder

As bananas ripen, their total soluble solids (TSS) rise due to the natural development of sugars, influencing sweetness and texture. The variations in ripeness allowed for powders with distinct sweetness, aroma, and nutritional properties suitable for various food applications, however limited due to poor solubility. To further enhance solubility, texture, and stability, the powdered banana was processed through a twin-screw extruder, where controlled heat and pressure improved digestibility and created a light, porous structure. The extruded product was then powdered again, producing a reconstituted banana

powder that dissolves easily in water, milk, or batter formulations.

The resulting powder is nutrient-rich, retaining natural vitamins, minerals, and dietary fibre, and can be instantly reconstituted into smoothies, beverages, baby foods, or bakery fillings. By utilizing bananas at varying maturity stages, it minimizes post-harvest losses while creating a versatile ingredient for snacks, confectionery, and functional food formulations. Moreover, it adds significant economic value by converting perishable produce into a high-value export commodity.

Banana Flower Malt as nutraceuticals

In the world of functional foods, the banana flower is blossoming into a nutritional powerhouse. Traditionally used in South Indian cuisine, banana flowers are rich in iron, antioxidants, dietary fibre, and plant proteins, making them an excellent ingredient for health-focused innovations.We have now transformed this nutrient-rich blossom into a banana flower-based malt, a delicious and convenient drink mix designed to boost energy and wellness. The process involves drying, roasting, and blending the banana flower into a fine malt powder that retains its natural flavour and health-promoting compounds.The resulting malt not only delivers a pleasant, earthy taste but also offers functional benefits like improving haemoglobin levels, supporting digestion, and enhancing immunity. Unlike commercial malted drinks, this formulation uses natural plant-based ingredients and no synthetic additives, making it a wholesome alternative for all age groups.

Smarter bioactive delivery using banana starch

In the ever evolving world of food technology, encapsulation has emerged as a fascinating innovation to protect and deliver sensitive bioactive compounds effectively. Bioactives such as fish oil and natural polysaccharides like laminarin are known for their tremendous health benefits, including antioxidant and immune-boosting properties. However, their sensitivity to oxidation and environmental stress often limits their direct use in food systems. In this process, fish oil and laminarin were

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encapsulated using ultrasound-assisted technology, where gentle sound waves help form fine, uniform capsules coated with banana starch and faba bean protein. These microcapsules act as protective shells, safeguarding the sensitive nutrients from oxidation and degradation while allowing them to be released gradually during digestion. This ultrasound-based method improved the overall stability, shelf life, and bioavailability of the encapsulated ingredients. The process enhances emulsion strength, reduces particle size, and creates stronger bonds between the wall materials, resulting in better entrapment of fish oil and laminarin.

Probiotic jelly

A probiotic banana jelly pudding has been developed using ripe banana juice, naturally rich in prebiotics that nourish beneficial gut bacteria. The pudding is developed using microencapsulation, a method that helps protect live probiotics Lactiplantibacillus plantarum from heat, oxygen, and stomach acids. The probiotics are coated with gum tragacanth, a natural gelling agent, which keeps them alive and active until they reach the gut, ensuring maximum health benefits. The result is a smooth, jelly-like pudding that's not only tasty and refreshing but also supports digestive wellness.

Fortified central core stem juice

Modified starch-encapsulated iron and folic acid were incorporated into banana stem juice to create a functional beverage that supports better health and wellness. Encapsulation using modified starch helps protect the sensitive nutrients, iron and folic acid from degradation during processing

and storage, ensuring better stability and absorption in the body. The encapsulation ensures that the nutrients are released gradually, improving their bioavailability while maintaining the drink's natural taste and appearance. The Recommended Dietary Allowance (RDA) for adults is 8 mg/day iron for men, 18 mg/day for women of childbearing age, and 400 µg/day of folic acid. Consuming 100 mL of the fortified stem juice would provide around 3 mg of iron and 7.5 mg of folic acid.

This approach transforms a traditional, locally available ingredient into a health-enhancing beverage, addressing common nutrient deficiencies like anaemia and folate insufficiency. It also highlights the potential of banana-based resources in developing functional, ready-to-drink formulations that merge science, health, and sustainability.

Conclusion

Banana, often celebrated for its delicious fruit, is proving to be much more than a tropical staple. Every part of the plant holds immense scientific and economic value. By transforming these underutilized components through innovative processing, researchers are redefining how agricultural resources can be used more efficiently and sustainably. This new wave of research shows how waste can become wealth, turning what was once discarded into functional, nutritious, and eco-friendly products. Such innovations not only address the pressing challenges of food waste, plastic pollution, and resource depletion but also open up new opportunities for rural entrepreneurship, green industry, and value-added markets. The approach aligns with global goals for sustainability, promoting a circular economy where agricultural residues are recycled into high-value materials rather than left as waste. Beyond environmental benefits, these developments contribute to food security, economic growth, and social impact of empowering farmers, industries, and consumers alike.

As the world seeks sustainable alternatives in every sector, the banana plant stands as a shining example of how nature and science can work together to create solutions that are not only innovative but also responsible and regenerative. This also creates newer business opportunities & sustainable environment for new age entrepreneurs.

Author's Bio

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The Rapid Rise of Plant-Based Meat in the Global Food Industry

The plant-based meat market is growing rapidly as more people seek out healthier and more sustainable food options. These products are designed to taste and feel like regular meat but are totally derived from plants. They relate not only to vegetarians and vegans but also to all those people who would eat meat but want to cut down on their intake of it. As food companies work on flavor, texture, and variety, plant-based meat is becoming common in grocery stores, restaurants, and home kitchens.

What Is Plant-Based Meat?

Plant-based meat is a food made from plant ingredients, generally soy, peas, wheat, chickpeas, beans, mushrooms, and other plant proteins, which, after processing, resemble animal meat in appearance and taste. Its main goal is to give consumers products that will cook and feel no different than traditional meat, be it burgers, sausages, nuggets, or minced items. For many people, plant-based meat offers a way to enjoy their favorite dishes while supporting healthier eating and reducing environmental impact.

What Are Key Market Stats?

The plant-based meat market size stood at USD 9.03 billion in 2024, as per the latest analysis by Polaris Market Research. The market is expected to grow at a CAGR of 19.7% between 2025 and 2034.

What Are Types of Plant-Based Meat?

Soy-Based Meat

One of the most common types is soy-based meat since soy is rich in protein and at the same time very easy to work with. Soy is used in burgers, strips, and minced-style products that need a firmer bite.

Pea Protein-Based Meat

Pea protein has gained a lot of popularity because it has a mild taste and is suitable for those who are allergic to soy or gluten. Many plant-based burgers and sausages incorporate pea protein into their product for a balanced texture.

Wheat and Seitan-Based Meat

Seitan, or wheat-based products, provide a chewy texture comparable to chicken or beef strips. They are used in dishes that require a firm and stretchy bite.

Other Sources of Ingredients

Other companies are creating unique flavors and textures with ingredients such as chickpeas, jackfruit, mushrooms, and beans. Such ingredients help brands offer more natural, simple products.

What Are End Use Segments of Plant-Based Meat?

Retail

Plant-based meat is now available in frozen and chilled sections of supermarkets. People purchase these products to prepare everyday meals at home.

Foodservice

Restaurants, cafes, and fast-food chains provide plant-based dishes to meet increasing consumer demand. These dishes make it easy for people to try plant-based meals when dining out.

Institutional Use

Healthy eating programs in schools, hospitals, and workplaces are incorporating more plant-based options into their menus.

What's Driving Market Forward?

Changing Food Preferences

Many people are choosing to eat less meat because they either want healthier lifestyles or want to support the environment. This shift in attitudes is boosting demand for plant-based products.

Health Awareness

Plant-based meat will often contain less saturated fat and no cholesterol; thus, this is often an appealing option to eat lighter or reduce certain health risks.

Environmental Concerns

Plant-based meat manufacturing generally requires much fewer natural resources compared to animal farming. As more people begin to care about the planet, plant-based options have become increasingly attractive to them.

Improved Taste and Quality

The taste and texture of plant-based meat have gradually improved over the past few years. New recipes and product launches have helped more people try and enjoy these foods.

More Availability

Supermarkets, restaurants, and online stores are giving more space to plant-based brands. The easier it becomes to find these products, the more people choose them.

What Are Key Market Trends?

- ***Cleaner Ingredient Lists:*** Consumers want simple ingredients they can recognize. Brands are working on plant-based meats with fewer additives and more natural components.
- ***Hybrid Products***: Some companies are making blended products that combine plant ingredients with small portions of traditional meat. They are primarily for consumers wanting to decrease meat intake gradually.
- ***New Protein Sources***: Companies are testing new kinds of plant proteins, such as mushrooms and algae, for better taste and nutrition.
- ***Growing Focus on Plant-Based Seafood***: The market is expanding beyond burgers and sausages. Plant-based fish, shrimp, and crab-style products are gaining attention.

Conclusion

The plant-based meat market is going to be a vital part of the global movement toward healthier and more sustainable food habits. No longer niche, plant-based meat tastes better, has simpler ingredients, and is easier to access across stores and restaurants. As consumer interest grows, and companies continue to improve their offerings, plant-based meat is expected to play an even bigger role in the future of food.

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Advanced Cold Chain and Tech-Enabled Perishable Logistics: Safeguarding Freshness in a Fast-Moving World

Ritesh Verma

In today's global food economy, freshness has become a promise that brands must keep, not just a quality attribute. From farm-fresh produce and dairy to frozen foods, seafood, meat, pharmaceuticals, and ready-to-eat meals, temperature-sensitive products now travel longer distances and pass through multiple touchpoints before reaching the consumer. This growing complexity has made advanced cold chain and technology-enabled perishable logistics a critical backbone of modern supply chains. As consumer expectations rise and regulatory standards tighten, companies are investing heavily in smarter, more resilient cold chain systems to ensure safety, quality, and consistency from origin to destination.

The cold chain is no longer limited to refrigerated trucks and warehouses. It has evolved into a sophisticated, digitally connected ecosystem where temperature control, data visibility, automation, and predictive intelligence work together to minimize losses and enhance efficiency. With food waste, product recalls, and spoilage still posing significant economic and reputational risks, advanced cold chain logistics is emerging as both a competitive advantage and a business necessity.

The Growing Importance of Perishable Logistics

The demand for reliable cold chain infrastructure is expanding rapidly, driven by changing consumption patterns, urbanization, and the growth of organized retail and e-commerce. Consumers today expect year-round availability of fresh fruits and vegetables, premium dairy products, frozen snacks, plant-based foods, and international cuisines. At the same time, online grocery platforms and quick-commerce models promise faster deliveries without compromising freshness. These trends place enormous pressure on logistics providers to maintain precise temperature conditions across every stage of the supply chain.

In emerging markets such as India, the need for advanced cold chain solutions is even more critical. A significant portion of food loss occurs post-harvest due to inadequate storage and transportation infrastructure. Strengthening cold chain logistics not only improves food security but also boosts farmer incomes, supports exports, and reduces overall waste. As governments and private players invest in cold storage facilities, reefer transportation, and integrated logistics parks, technology is playing a defining role in bridging existing gaps.

From Traditional Refrigeration to Intelligent Cold Chains

Traditional cold chain systems were largely reactive, relying on manual temperature checks, paper-based records, and corrective actions taken after problems occurred. While refrigeration ensured basic temperature control, it offered limited visibility into real-time conditions during transit or storage. Any deviation often went unnoticed until products reached warehouses or retail shelves, by which time damage was already done.

Advanced cold chains are fundamentally different. They are proactive, data-driven, and highly responsive. Sensors, connectivity, and automation now enable continuous monitoring of temperature, humidity, shock, and location throughout the journey. Instead of simply maintaining cold conditions, modern systems focus on preserving product integrity, shelf life, and nutritional value. This shift from temperature control to quality control is redefining how perishable logistics is designed and managed.

The Role of IoT and Real-Time Monitoring

The Internet of Things has become the foundation of tech-enabled cold chain logistics. Smart sensors installed in storage facilities, containers, pallets, and vehicles continuously collect data on environmental conditions. This information is transmitted in real time to centralized dashboards, allowing logistics managers to track shipments with unprecedented accuracy.

Real-time monitoring enables immediate alerts when temperature deviations occur, helping operators take corrective action before products are compromised. For example, if a reefer truck experiences a cooling unit malfunction, the system can notify the driver and control center instantly, reducing the risk of spoilage. Over time, the collected data also provides valuable insights into recurring issues, helping companies

optimize routes, equipment maintenance schedules, and handling practices.

For food manufacturers and retailers, this visibility enhances trust and accountability across the supply chain. It ensures compliance with food safety regulations and provides verifiable records that can be shared with auditors, regulators, and customers.

Automation Transforming Cold Storage and Warehousing

Cold storage facilities are undergoing a significant transformation as automation becomes more prevalent. Operating in sub-zero temperatures is physically demanding and costly for human labor, making cold warehouses ideal candidates for automation. Automated storage and retrieval systems, robotic palletizers, conveyor systems, and autonomous mobile robots are increasingly used to handle goods with speed and precision.

Automation improves operational efficiency by reducing handling time, minimizing human error, and optimizing space utilization. High-density storage systems allow warehouses to store more products in smaller footprints, reducing energy consumption per unit stored. Automated systems also support faster order fulfillment, which is crucial for perishable goods with short shelf lives.

In addition, warehouse management systems integrated with temperature monitoring tools provide end-to-end visibility within storage facilities. These systems track inventory movement, monitor dwell times, and ensure first-expiry-first-out practices, further reducing waste and improving inventory turnover.

AI, Analytics, and Predictive Intelligence

Artificial intelligence and advanced analytics are adding a new layer of intelligence to cold chain logistics. By analyzing historical and real-time data, AI models can predict potential risks, such as equipment failures, route delays, or temperature fluctuations caused by external factors. This predictive capability allows logistics providers to take preventive measures rather than reacting to problems after they occur.

Predictive analytics also helps optimize demand forecasting and inventory planning for perishable products. By aligning production, storage, and transportation more accurately with demand patterns, companies can reduce overstocking and understocking, both of which contribute to waste. For large food brands and retailers, AI-driven insights support better decision-making across the entire supply chain, from sourcing and production to distribution and retail.

Blockchain and Traceability in Cold Chains

Traceability has become a critical requirement in perishable logistics, especially in the wake of food safety incidents and increasing regulatory scrutiny. Blockchain technology is gaining traction as a tool to enhance transparency and trust across cold chains. By creating an immutable, shared record of every transaction and condition change, blockchain ensures that all stakeholders have access to accurate and tamper-proof information.

In a blockchain-enabled cold chain, data from IoT sensors, logistics providers, and storage facilities is recorded at each stage. This makes it easier to trace the origin of products, verify handling conditions, and identify the root cause of any quality or safety issues. For exporters, blockchain can simplify compliance with international standards and improve acceptance in global markets. For consumers, it reinforces confidence in the safety and authenticity of perishable products.

Sustainable Cold Chain Solutions

Sustainability is becoming a central focus in the evolution of cold chain logistics. Refrigeration and cold storage are energy-intensive, contributing significantly to operational costs and carbon emissions. As environmental concerns grow, companies are exploring ways to make cold chains more energy-efficient and eco-friendly.

Advances in insulation materials, energy-efficient compressors, and natural refrigerants are helping reduce the environmental impact of cold storage and transportation. Solar-powered cold rooms and hybrid reefer systems are gaining popularity in regions with unreliable power supply. At the same time, digital optimization tools help reduce fuel consumption by improving route planning and load efficiency.

Reducing food loss is another major sustainability benefit of advanced cold chains. By preserving quality and extending shelf life, technology-enabled logistics directly contributes to waste reduction, making cold chains a key enabler of sustainable food systems.

E-Commerce and the Last-Mile Cold Chain Challenge

The rapid growth of e-commerce and quick-commerce has introduced new challenges for perishable logistics, particularly in the last mile. Delivering temperature-sensitive products directly to consumers within short timeframes requires highly coordinated operations and specialized packaging solutions.

Insulated packaging, gel packs, phase-change materials, and smart packaging technologies are being used to maintain temperature during last-mile delivery. Real-time tracking and delivery optimization platforms ensure that products reach consumers quickly while maintaining quality. For urban areas, micro-fulfillment centers and dark stores equipped with cold storage are emerging as critical nodes in the perishable logistics network.

As consumer expectations for speed and freshness continue to rise, last-mile cold chain capabilities will play an increasingly important role in differentiating brands and logistics providers.

The Road Ahead for Cold Chain Logistics

The future of advanced cold chain and perishable logistics lies in deeper integration of technologies, greater collaboration among stakeholders, and continued focus on resilience and sustainability. As supply chains face disruptions from climate change, geopolitical uncertainties, and fluctuating demand, cold chains must be agile and adaptive.

Digital twins, autonomous vehicles, and next-generation sensors are expected to further enhance visibility and control in cold logistics. Collaboration between food producers, logistics providers, technology companies, and policymakers will be essential to build scalable and inclusive cold chain infrastructure, particularly in developing economies.

Ultimately, advanced cold chain logistics is not just about moving goods at the right temperature. It is about protecting value, ensuring safety, supporting sustainability, and meeting the evolving expectations of consumers. As the food and beverage industry continues to grow and diversify, tech-enabled perishable logistics will remain a cornerstone of efficient, reliable, and future-ready supply chains.

GNT expands Middle East operations with new application laboratory for plant-based EXBERRY® colors

GNT has opened an application laboratory in Dubai to provide hands-on support for manufacturers using its plant-based EXBERRY® colors in the Middle East, North Africa, and Indian subcontinent. Located alongside GNT's commercial and marketing teams in the UAE, it marks a significant milestone in the company's commitment to delivering localized technical assistance and faster turnaround. The facility features state-of-the-art instrumentation and local formulation expertise, with services including color matching and stability testing. The laboratory also serves as a hub for product demonstrations, training programs, and technical consultations.

Santhosh Thankappan, Sales Director at GNT Middle East, said: "Our goal is to empower food and drink manufacturers with local access to global expertise – giving them a space for innovation where ideas, technology, and people come together. Our new Dubai laboratory was created to help our customers perfect their processes and ensure exceptional results with plant-based EXBERRY® colors."

GNT – which also has multiple application centers in Europe, Asia, and North America – creates EXBERRY® colors from non-GMO fruit, vegetables, and plants. They are available in a complete spectrum of shades and can be used to replace synthetic dyes in almost any type of food and drink.

Santhosh Thankappan added: "The demand for natural, plant-based colors is increasing all over the world – and this region is no exception. This expansion reinforces our dedication to helping manufacturers achieve vibrant, stable shades while maintaining completely natural ingredient lists."

www.exberry.com

Prediction meets taste: Symrise expands Symvision AI™ to proprietary taste development tools

Symrise announces a major addition to its award-winning foresight platform Symvision AI™ by complementing its AI-based trend prediction capabilities. In addition to identifying new market opportunities, it now also features a powerful suite of AI-assisted tools for formula prediction. This speeds up taste creation and thereby food and beverage development.

The platform's expansion follows a clear objective expansion: Accelerating innovation. Its advanced AI capabilities empower flavorists to predict optimal formulations and their sensory performance with high precision. This results in enabling the swift development of taste experiences that resonate with evolving consumer preferences. Product reformulations also benefit from these expanded capabilities. Specifically, they support products low in sugar or sodium that deliver on the market need for healthier lifestyles. Also, they address the growing demand for healthier options with great taste.

By combining machine learning with deep flavorist expertise, Symrise equips its customers to lead in a dynamic market where creativity, precision and speed are essential. "Our Symvision AI™ design toolbox also predicts the impact of formula changes, guides taste development and enables us to respond rapidly and precisely to market changes," says Leif Jago, Global Marketing Manager Food & Beverage at Symrise. "Evolving consumer expectations, sudden price shifts and supply chain events, drive the need for innovation and swift formula adjustments. Symvision AI™ delivers exactly that— it empowers us to innovate faster and smarter."

Key benefits for Symrise customers

- Optimized taste: Science-based formulations crafted for optimal sensory appeal and market fit, delivering against customer and consumer needs.
- Tailored solutions: Recipes developed through a unique combination of deep flavorist expertise and machine learning, easily adaptable to individual ingredient restrictions and regulatory changes.
- Faster go-to-market: Accelerated innovation cycles through predictive modeling and impact forecasting.

Symvision AI™'s sensory design features include an interactive dashboard cockpit that visualizes formulation and sensory characteristics. For example, when reducing sugar content, the tool forecasts the resulting sweetness profile and identifies gaps in taste intensity. It then guides related formulation options, including symlife™ taste balancing solutions, to close those gaps—ensuring optimal taste in both new and reformulated products.

"We combine the profound expertise of our specifically trained flavorists with machine learning," adds Gerhard Krammer, SVP Research & Technology at Symrise Food & Beverage. "This approach shortens development cycles and unlocks exciting possibilities in taste creation. We are supporting our customers to meet evolving consumer demands with speed and confidence. By combining deep flavorist expertise with machine learning, Symrise empowers its customers to lead in a dynamic market where creativity, precision and speed are essential, thereby accelerating customers' innovation advantage."

One platform, ever-evolving possibilities

This novel flavor design approach operates through a sophisticated multi-step process, identifying ideal formulation options fast:

1. Ingredient selection: Choosing the most promising raw materials from Symrise's differentiated, proprietary portfolio.
2. Design of experiment: Narrowing down prototypes via statistical modeling.
3. Sensory & consumer testing: Validating sensory characteristics and building predictive models.
4. Flavoristic creation refinement: Combining deep flavorist expertise with model outputs to deliver solutions with optimal market fit.

This proprietary approach reduces trial-and-error, speeds up decision-making, and increases the likelihood of successful product launches.

"This unique way of taste development and design, as part of our Symvision AI™ offering, presents a clear example of Symrise's forward-thinking and sensory-driven approach," concludes Conor Delahunty, VP Global Insights Food & Beverage. "It enriches our Symvision AI™ market foresight capabilities with formula optimization strength. Hence, it equips our customers to navigate the complexities of today's food and beverage market with greater agility and success—today and in the future. We will continue to accelerate advantage for our customers!"

www.symrise.com

ystral Expands Strategic Presence in India with New

Bangalore Facility Site to Evolve into Regional Service Hub for Asian Markets

Ystral, the German specialist in mixing, dispersing and powder-wetting technologies, is significantly strengthening its operations in India with the opening of a new facility in Bangalore. The expansion, which includes a larger technical and service team as well as increased local procurement, underscores the company's long-term commitment to the Indian and Southeast Asian markets.

For decades, ystral has been a global leader in the design and manufacture of high-performance mixing, dispersing and powder-wetting machines, as well as turnkey process systems serving the chemical, pharmaceutical, coatings and paints, food, home and personal care, and battery production industries. The company has operated in India since 2013 through its wholly owned subsidiary, ystral india pvt ltd. The relocation to the new Bangalore site will enable the Indian team to expand from nine to fifteen specialists across process engineering, electrical engineering, software development, sales, and service.

"This move reflects our continued commitment to enhancing operational efficiency and delivering world-class service to our customers," said Srirangarajan Santhanam, Director of ystral india. "Our new premises are equipped with advanced infrastructure and tools that meet the standards of our German headquarters, ensuring we continue to provide innovative, reliable and technically sophisticated solutions."

Strengthening Competitiveness Through Localisation

As part of its strategic growth plan, ystral will further increase the degree of component manufacturing undertaken within India while continuing to produce key high-precision components in Germany. "Through increased localisation, we are confident that we will remain highly competitive in the dynamic Indian market. Local sourcing enables us to reduce lead times, offer delivery in INR, and accelerate project execution – speed being a decisive success factor in India," said Dominik Seeger, Senior Vice President Sales at ystral.

India as a High-Growth Strategic Market

India is currently ystral's fastest-growing market worldwide. The new Bangalore facility is expected to evolve into a regional service hub supporting neighbouring Asian markets, and to complement operations in China and Singapore by taking on additional service responsibilities. In addition, ystral india is expected to contribute software development services to the company's global headquarters in Germany. With this expansion, ystral reinforces its strategic commitment to India as a core market and positions itself to meet the increasing demand for advanced mixing and process technologies across Asia.

Kerry Signs Strategic Agreement with Expo City Dubai to

Establish New Regional Customer Co-Creation Centre to Drive Food & Beverage Innovation

Kerry, a global leader in sustainable taste and nutrition solutions, today announced the signing of a long-term lease agreement with Expo City Dubai to

establish its new Regional Customer Co-Creation Centre. The agreement represents a significant milestone in Kerry's continued growth across the Middle East and underscores the company's commitment to driving food and beverage innovation in one of the world's most dynamic markets.

Located in the heart of Expo City Dubai — the UAE's first Green Innovation District and a thriving global hub for innovation, sustainability and future-focused development — the new Kerry facility will serve as a state-of-the-art regional centre for research, development and applications. Leveraging Kerry's deep scientific expertise and global capabilities, the centre will enable Kerry to work even more closely with customers, supporting them from concept through to commercialisation and accelerating the delivery of high quality, market-ready products with greater speed, efficiency and impact.

"Our partnership with Expo City Dubai marks an exciting milestone for Kerry as we continue to expand our presence and capabilities across the Middle East," said Peter Dillane, President and CEO of Kerry APMEA. "We are deeply grateful to Her Excellency Reem Al Hashimy, UAE Minister of State for International Cooperation and CEO of Expo City Dubai Authority, for her vision in positioning Expo City as a platform for world-class research and innovation, and to Ambassador of Ireland to UAE, Alison Milton and Minister for Enterprise, Tourism and Employment of Ireland, Peter Burke, for their leadership in strengthening economic ties and championing investment in food technology. Together, we share a common ambition to advance collaboration and innovation across the global food ecosystem."

Creating a World-Class Ecosystem for Food & Beverage Innovation

Kerry's new Expo City facility is designed to elevate customer collaboration and accelerate the development of sustainable, nutritious and market-leading innovation.

The centre will:

- Build a world-class ecosystem that connects customers, food and beverage manufacturers, academic institutions, government entities and industry experts.
- Provide an immersive environment showcasing Kerry's integrated portfolio of science- backed sustainable nutrition solutions across Taste, Proactive Health, Enzymes, and Food Protection and Preservation.
- Enable deeper co-creation with customers to deliver the next generation of food and beverage solutions tailored to the needs of consumers in the Middle East and beyond.

"As the UAE's first Green Innovation District, Expo City is dedicated to hosting businesses, innovators and organisations who are actively engineering positive sustainable change," said Marjan Faraidooni, Chief of Education and Culture, Expo City Dubai. "We're delighted to welcome Kerry to our growing community, where its expertise in sustainable nutrition will be an important addition to our ecosystem as we work together to build a decarbonised and resilient future."

ADVERTISER'S INDEX

Amcor collaborates with industry leaders for Danish food packaging recycling project

Amcor a global leader in developing and producing responsible packaging solutions, announced the support of an ambitious three-year plastic recycling project led by Danish Technological Institute. The co-funded innovation partnership Circular Recycling Innovation for Sustainable Packaging (CRISP) aims to establish the full-scale circular recycling of food packaging in polyethylene (PE) and polypropylene (PP) rigid plastics from household collections.

Besides Amcor, the project will involve major food manufacturers and waste management specialists. Amcor will bring recycling and technical expertise from its state-of-the-art CleanStream® facility in Leamington Spa, UK, and their packaging production facility in Randers, Denmark, utilizing its knowledge, skills and experience in producing and designing food packaging in recycled materials.

The CRISP partnership has the potential to significantly contribute to the implementation of a circular plastic economy in Denmark. The effort is timely with the EU targeting a plastic recycling rate of 55% by 2030*. The Packaging and Packaging Waste Regulation (PPWR) stipulates that by the same year, the majority of plastic packaging must be designed for recyclability, allowing materials to be reused or recycled effectively. **

"Sustainable challenges require industry collaboration, and this partnership will demonstrate what can be done when the supply chain comes together," said Christian Bruno, R&D director for North East Europe at Amcor. "We are proud to be part of a project that could potentially have a significant environmental impact in Denmark and set new standards worldwide."

It is anticipated that the CRISP partnership will help develop and mature a systemic solution to deliver food-grade packaging from post-consumer sources. Collaboration is the driver for this change and focus will also be on the documented traceability of food contact materials in the recycling loop. The goal is to create a new, fully circular, market for the circular recycling of food packaging in rHDPE and rPP. All this aligns with Denmark's Extended Producer Responsibility (EPR) scheme, which obligates producers to pay for the packaging they place on the market, while also offering financial incentives for more sustainable product design and material selection.

Christian Bruno added: "The long-term goal is to establish circular loops for food plastic packaging aligned with the design guidelines from the PPWR. The EU's goals are driving this industry to greater highs; the project will make a strong business case for the entire value chain, with improved traceability of food contact materials in the recycling system."

Business Manager Per Sigaard Christensen from Danish Technological Institute said: "We are delighted to bring together this highly knowledgeable and innovative consortium. This three-year project has the potential to provide a clear pathway towards the circular recycling of PE and PP food packaging." Amor's proprietary CleanStream® technology mechanically recycles domestically recovered household waste into high-purity recycled plastic. It can operate within existing waste management infrastructures. In the UK, Amcor's Leamington Spa facility has the capacity to recycle nearly 40% of all UK PP waste collected from domestic recycling bins.

**https://www.valpak.co.uk/eu-recycling-targets-progress-and-challenges-on-the-path-to-a-circular-economy/*

**** While the PPWR applies broadly, there are specific exemptions and derogations for certain categories—such as medicinal, pharmaceutical, and other contact-sensitive packaging—which may follow alternative timelines or requirements**

Tetra Pak launches world-first paper-based barrier for juice packaging with García Carrión and advances new packaging material development

Tetra Pak, in collaboration with García Carrión, today unveiled the first-ever use of its paper-based barrier technology for juice packaging. This innovation in sustainable food packaging solutions marks a significant step towards reducing reliance on fossil-based materials, with the new packaging material now being rolled out across multiple markets.

World-first aseptic carton with paper-based barrier for the juice category

Tetra Pak, together with leading Spanish beverage producer García Carrión, has launched the Tetra Brik® Aseptic 200 ml Slim Leaf carton featuring a paper-based barrier for juice, under the flagship Don Simón brand. This is the first juice portion pack globally to use the innovative barrier and the first such package available in Spain. Made with up to 80% paper, the packaging reinforces its sustainability credentials. The combination of the paper-based barrier with plant-based polymers used in the

packaging material coatings, pushes the renewable content to a remarkable 92%, while reducing the carbon footprint by 43% compared with an aseptic package that uses aluminium foil layer and fossil-based polymers, as verified by the Carbon Trust1.

"We are proud to lead the way in sustainable packaging for the juice category. For more than 135 years, García Carrión has been committed to responsible innovation and respect for the environment," said Don José García Carrión, President of García Carrión. "This innovation supports our mission to reduce environmental impact while offering high-quality products to our consumers", added Fala Corujo, Vice President of García Carrión. For García Carrión, this packaging solution represents a new industrial application of its 360° Sustainability Strategy, recognised with the Factories of the Future Award 2024 for Excellence in Sustainability and Circular Economy.

Tatiana Liceti, Executive Vice President, Packaging Solutions at Tetra Pak commented: "This launch represents a significant step in our journey towards fully renewable and recyclable packaging. By working closely with our customers, we're proving that sustainable innovation can scale across markets and categories, while ensuring packaging retains its functionality and quality."

What is the paper-based barrier?

Tetra Pak's paper-based barrier is a breakthrough in aseptic carton design. It replaces the traditional aluminium foil layer with a renewable, paper-based barrier, promoting the shift from a fossil-based material to a low-carbon, renewable alternative and reducing package's carbon footprint. Together with other layers in the packaging, the paper-based barrier protects against oxygen, light, moisture and bacteria ensuring food safety is not compromised, and shelf life is comparable to packages with the aluminium foil layer. Aseptic cartons with a new paper-based barrier can be collected, sorted, and recycled where recycling infrastructure is in place, at scale. The new paper-based barrier is expected to deliver additional benefits downstream for recycling infrastructure efficiency. These include maximising the recovery of paper content from the recycling process of carton packages, while ensuring high-quality fibre and non-fibre fractions.

Tetra Pak's paper-based barrier technology is part of its broader ambition to create the world's most sustainable food package – one that is paper-based, made solely from responsibly sourced renewable or recycled materials, has the lowest possible carbon footprint and is fully recyclable2.

Tetra Pak's aseptic beverage carton with a paper-based barrier was launched in collaboration with a dairy company in Portugal in 2023. It was recognised as a groundbreaking innovation in sustainable packaging, receiving the "Resource Efficiency" award at the Sustainable Packaging News Awards 2024.

1Source: Carbon Trust™- verified Tetra Pak 'Carton CO2 Calculator' model version 11 (valid from 2025-01-01). Scope: cradle-to-grave measurement of a Tetra Brik® Aseptic 200 Slim Leaf carton with plant-based polymers in coating and paper-based barrier compared to a Tetra Brik® Aseptic 200 Slim Leaf package with aluminium foil layer and fossil-based polymers. Geography: EU Industry data.

2This means creating cartons that are fully made of renewable or recycled materials, that are responsibly sourced, therefore helping to protect and restore our planet's climate, resources and biodiversity; contributing towards low carbon production and distribution; are convenient and safe, therefore helping to enable a resilient food system; are fully recyclable.

Lecta presents Metalvac Ice Cream, its innovative solution for the ice cream sector

A new recyclable solution with barrier properties, suitable for flexible packaging of frozen food products such as ice cream cones.

Lecta, a company specializing in the design and development of paper-based solutions for flexible packaging, is expanding its range of metallized papers with Metalvac Ice Cream, a paper that meets the current requirements for technical performance, industrial efficiency and sustainability in the sector.

Metalvac Ice Cream is an innovative paper intended as a more sustainable alternative to existing laminate solutions on the market. Available in 123 gsm, this new paper offers high-quality printing in offset, flexography and rotogravure on its metallized side. Its water-vapor barrier also ensures optimal preservation of wafer cones, in direct contact with the paper, throughout the supply chain.

This, along with its excellent runnability, positions Metalvac Ice Cream as a reliable and efficient solution for industry packing lines. This new metallized paper is recyclable within the paper and cardboard recycling stream, in accordance with CEPI recyclability standards. It also aligns with circular economy principles and represents an efficient, more sustainable alternative for multiple flexible packaging applications. The Metalvac range offers various paper grades with heat-sealability properties and barrier to light, water vapor, oxygen, and aroma, as well as resistance to moisture and grease (no PFAS added). These high-vacuum metallized papers stand out for their excellent runnability and adaptability to standard packing lines on the market, ensuring efficiency throughout the production process.

Its low aluminum content (0.08 gsm) contributes to achieving high barrier performance without compromising the material's recyclability within the paper recycling stream. With the Metalvac range and the launch of Metalvac Ice Cream, Lecta reaffirms its commitment to responsible innovation and to advancing toward a more sustainable future for the flexible packaging sector.

The entire Metalvac range is produced following Good Manufacturing Practices (GMP) and Food Safety (FSSC 22000) standards, in compliance with environmental management standards ISO 14001 and EMAS, energy efficiency ISO 50001, quality ISO 9001, and occupational health and safety ISO 45001. Additionally, it is available upon request with PEFC or FSC® C011032 Chain of Custody forest certifications.

www.lecta.com

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Just as expert navigation is in leafcutter ants' DNA, our Mobile Material-Handling solutions synchronise your material flow seamlessly across dynamic factory systems, following optimised paths.

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