November/December 2021
Vol.29 No.5

what's new in FOOD technology & manufacturing

WHAT'S NEXT FOR FROZEN FOOD & THE COLD CHAIN?

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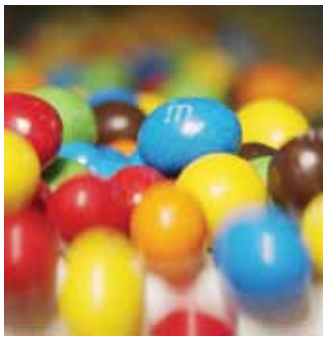

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Tasmanian seaweed company receives funding from AMGC

Tasmanian seaweed producer and manufacturer Sea Forest has received federal government co-investment of $675,000 from the Advanced Manufacturing Growth Centre (AMGC). The funding will be used to develop and manufacture the company's novel method for delivering oil-based *Asparagopsis* seaweed as an additive to feed solutions for milk, beef and wool livestock to reduce digestive-related methane emissions.

The funding follows the recent capital-raising by Sea Forest to expand marine farming, harvesting and processing operations at its 1800-hectare sea lease at Triabunna, just north of Hobart. The company's operations feature a hatchery with a marine lease growing *Asparagopsis* seaweed and a processing plant that converts the seaweed into user-friendly products that reduce carbon emissions.

The world seaweed market is currently worth $11 billion and the Australian Seaweed Institute predicts that the Australian market could be worth $100 million in 2025 and $1.5 billion by 2040.

According to the CEO of Sea Forest, Sam Elsom, the company is making good progress with its *Asparagopsis* seaweed feed supplements. "From our stage one farm we plan to produce 7000 tonnes a year of seaweed for livestock, which will go a long way, initially cutting carbon emissions from livestock by about 400,000 tonnes per year."

Zetifi unit testing

Dr Jens Goennemann, Managing Director of AMGC said: "Sea Forest's solution is grounded in solid research which reduces methane emissions from livestock flatulence. Sea Forest has proven that local manufacturing can deliver globally relevant products that reduce carbon emissions and do so with no impact to operations for milk, beef and wool producers."

Administered in consultation with all Industry Growth Centres, the 4th and 5th tranche of funding from the federal government's Modern Manufacturing Initiative has been awarded to 10 Australian manufacturers to address many of the six National Manufacturing Priorities. The successful round four and five recipients included two from the food and beverage sector (which is one of the priorities):

- Sea Forest Ltd (TAS) – detailed above. Total project commitment $3.24 million ($675,000 from Commercialisation Fund)
- Zetifi (NSW) – Commercialisation of ZetiBase, a high-availability wireless network gateway for regional and remote businesses. Total project commitment $812,000 ($396,000 from Commercialisation Fund)

The other eight projects included:

- MolyCop (NSW) – Recycling
- Sleeptite (VIC) – Medical
- Nexxis (WA) – Resources Technology & Critical Minerals Processing
- mDetect (VIC) – Resources Technology & Critical Minerals Processing
- Savic (VIC) – Clean Energy
- Samsara (NSW) – Recycling
- Ellen Medical Devices (NSW) – Medical Products
- Kinaltek (NSW) - Resources Technology & Critical Minerals Processing

These 10 co-invested projects represent a total investment of $16.2 million, with 60% of total funds ($10.1 million) contributed by the manufacturing industry and the remainder ($6.1 million) from AMGC's $30 million Commercialisation Fund.

"The latest round of investment via the Commercialisation Fund brings the total number of projects supported to 31. Each of these projects will generate significant opportunities, injecting close to $50 million into local operations to commercialise, scale and take Australian products global," Dr Goennemann said.

For more information and to apply for a grant go to: https://www.amgc.org.au/projects/.

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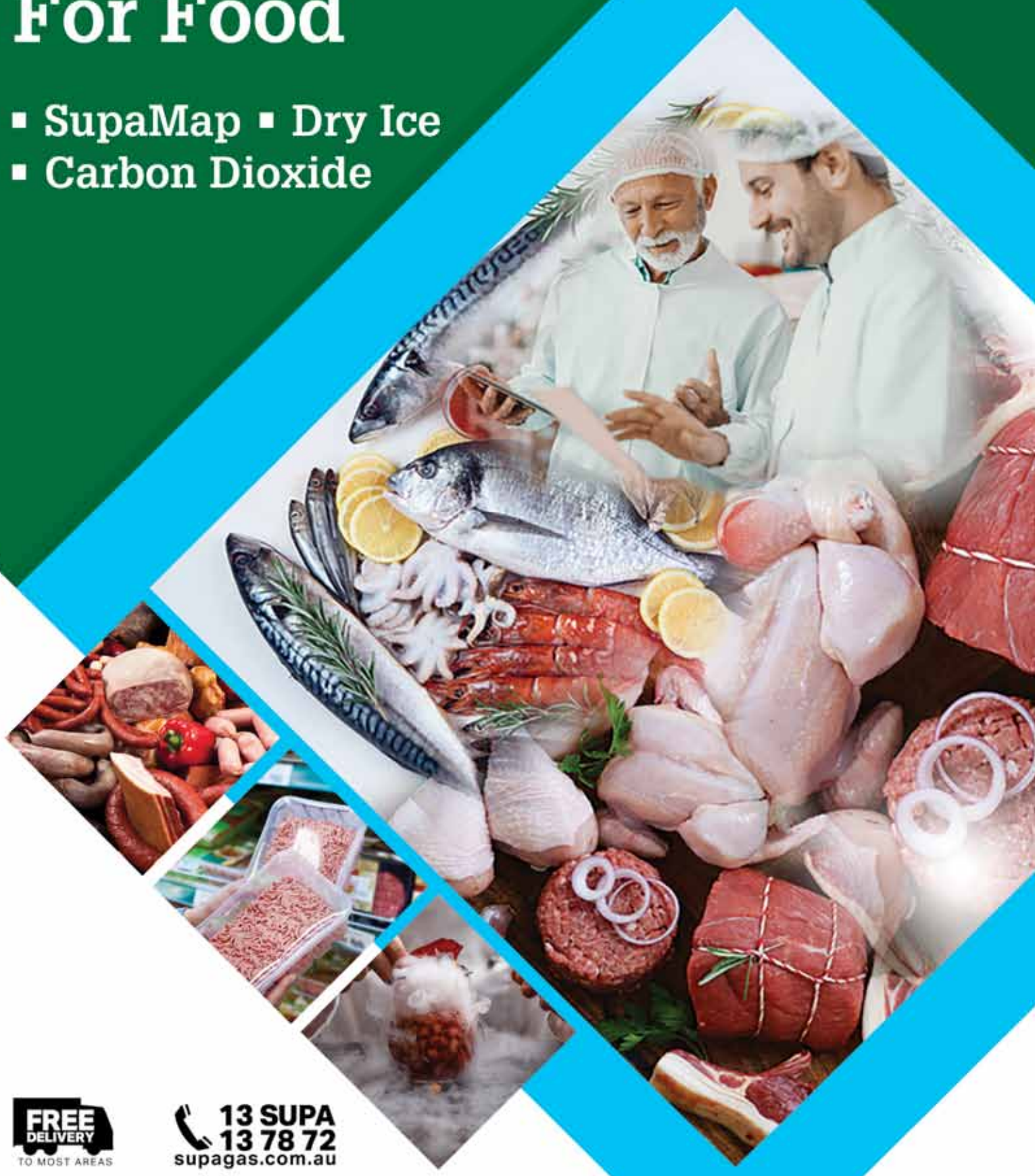

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Mars Wrigley unwraps investment for its Ballarat factory

Mars Wrigley Australia is investing $30 million into its Ballarat factory in order to advance its local manufacturing capabilities and future-proof its Australian operations.

The investment will allow the Victorian factory to expand its range of chocolate bars in addition to supporting improvements to the chocolates that it currently produces there, including the M&M's and Pods lines. Furthermore, the expansion will see the introduction of a new packaging line that will allow for an increased volume of production for Maltesers chocolates which in turn will allow for an increase in exported products.

"While the majority of our products are made in Australia today, our ambition is to make even more of our products here in the future. The new $30 million investment into our Ballarat factory will support our ambition by enhancing our on-shore manufacturing technologies and capabilities to ensure our Australian business remains globally competitive," said the general manager of Mars Wrigley Australia, Andrew Leakey.

The new funding builds on the $37 million investment for the Ballarat site that Mars Wrigley announced in 2020.

Flexicon relocates and expands Australian operations

Flexicon Corporation (Australia) Pty Ltd, a wholly owned subsidiary of Flexicon Corporation (Bethlehem, PA, USA), more than doubled the size of its manufacturing and sales operation in July 2021, it was announced by David Gill, President.

"The demand for Flexicon equipment in the greater Australasia region required us to triple our manufacturing space in 2008, and now double it in 2021," he said. "Our new facility is situated on a large parcel with provision for future growth."

Located at 795 Boundary Road in Darra, Queensland, the 2390 m² building dedicates 1730 m² to manufacturing of Flexicon flexible screw conveyors, pneumatic conveying systems, tubular cable conveyors, bulk bag unloaders, bulk bag fillers, bulk bag conditioners, manual dumping stations, drum/box/container tippers, weigh batching systems and automated plant-wide systems. The remaining 660 m² of office space houses administrative personnel, increased engineering sales staff and visitor conference rooms.

A test laboratory scheduled for completion by end of year will simulate customer installations and verify performance on full-scale equipment.

Tim Greene, Managing Director of the Australian operation said: "Flexicon Australia's relocation and expansion come at the perfect time as we take on more territories throughout Asia and continue to enjoy steady growth in our local markets. The extra space affords us the ability to grow in areas that will bring the most value to our customers and foster strong relationships into the future."

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Brewing a high-tech coffee

VTT, a Finnish research institution, has produced coffee cells through the use of a bioreactor and cellular agriculture, with the resulting coffee reportedly smelling and tasting like conventional coffee.

With increasing demand and sustainability challenges concerning traditional coffee agriculture, there is a need for alternative ways of producing coffee. A method that sidesteps the substantial land usage of the coffee bean industry could allow for a more environmentally friendly way of producing coffee.

The idea of growing coffee in a bioreactor is not especially new, having been suggested back in the 1970s. The modern method uses the currently available technology — VTT cultured coffee cell lines before growing them in bioreactors. After enough biomass was produced it was subsequently roasted using a technique developed by VTT especially for this procedure.

The researchers believe that they may be four years away from having developed the technology enough to seek regulatory approval and thus move to a commercial scale of production.

Youfoodz to build production facility in Qld

Youfoodz has finalised arrangements for a new production facility to be built at its Berrinba Logistics Estate in Queensland.

LOGOS Property Group (LOGOS) will manage the construction of the custom-built 13,700 m^2 facility in Berrinba, which will bring together Youfoodz' three existing production sites, as well as its marketing, administration and distribution locations, all under one roof.

The facility is designed to increase production capacity from the current, capacity-constrained 420,000 meals per week to 800,000 per week — increasing to 1.5 million meals per week in time. It will also increase raw material demand from 160 tonnes processed per week to 350 tonnes and higher over time, which is set to benefit local primary producers who provide approximately 90% of ingredients.

The facility will be built with new equipment, streamlined food handling processes and industry-leading food safety standards. It will also include a full menu development kitchen, photography studio, offices, meeting spaces and training rooms.

Completion of the build is expected between July and September 2022.

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Buzz-iness is good for bee-free honey start-up

Californian-based start-up MeliBio is developing a technology based on plant biology, fermentation and food science that can replace honeybees with microorganisms as a medium for honey production. Its goal is to produce plant-based honey that matches and improves on the molecular composition of bee-made honey.

Now MeliBio has seen investment from CULT Food Science Corp., an investment platform that specifically concentrates on the lab-grown food industry. This follows from MeliBio receiving almost $1 million in funding from a range of personal and venture capitalist investors in March of this year.

"At CULT, we believe strongly that the future of food will be science-based. In addition to pursuing lab-grown meat and cultured dairy investments, our team is diligently working to identify and deploy capital to the most innovative early-stage companies across the entire lab grown food ecosystem. The MeliBio team has an unrivalled expertise and passion, and we are thrilled to be able to support their mission of pioneering sustainable honey," said Dorian Banks, CEO of CULT.

MeliBio honey is expected to be commercially available on a limited basis by the end of 2021, with wider availability in 2022.

NZ pumpkin milk to hit shelves in Asia

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New Zealand has exported a unique plant-based milk to Asia thanks to a partnership between a Hawke's Bay company and the Ministry for Primary Industries (MPI).

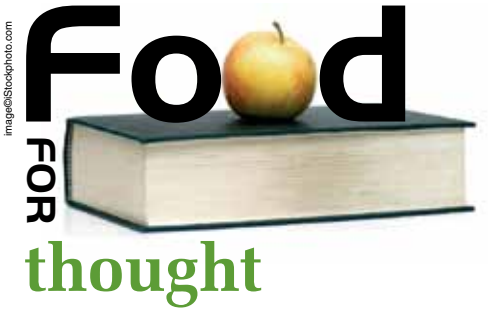
Made from New Zealand-grown kabocha buttercup squash, the Kabochamilk product is a collaboration between Shane Newman — a New Zealand buttercup squash grower from Hawke's Bay, and Sachie Nomura — a Japanese celebrity chef and the brains behind avocadomilk, an award-winning plant-based milk.

MPI contributed more than $95,000 through its Sustainable Food and Fibre Futures fund (SFF Futures) to help boost efforts to formulate, manufacture and market a shelf-stable kabocha milk recipe that would appeal to consumers in Japan, Korea, China and beyond.

The plant milk uses the un-exported tag-3 fruit to create a high-value product from produce that would otherwise go to waste.

"It's immensely satisfying to have hit upon a new opportunity for New Zealand's kabocha industry," Newman said.

New Zealand is one of the largest exporters of kabocha to Japan and Korea. By tapping into the strong distribution and retail channels Newman and his family have established from over 40 years of fresh horticultural and export business, Kabochamilk is able to gain access to a large distribution network of around 5000 Asian retailers, supermarkets and convenience store chains.



Oat milk on trend

Oat milk has become the plant-based milk of choice in the UK, according to the latest research from Mintel.

Sales of oat milk almost doubled between 2019 and 2020 in the UK as Brits spent around £146 million (AU$246m) on the non-dairy milk substitute in 2020. By contrast, consumers spent £105 million (AU$199m) on almond milk in 2020, resulting in oat overtaking almond to become the nation's number one selling vegan milk.

"The plant-based trend continues to gain momentum in the UK, fuelled by environmental and health considerations," said Amy Price, Senior Food and Drink Analyst, Mintel.

"Oat milk was the main beneficiary of the accelerated demand in plant-based milk during 2020, overtaking almond milk as the top-selling plant-based milk. Oat milk's previous robust growth has attracted a lot of innovation to the segment including barista-style varieties. The rapid sales growth of plant-based milk has brought about new product development from established players and new entrants alike."

According to research, the total spend on plant-based milk (including oat, almond, soya, coconut and rice) increased 32% from 2019 reaching £394 million (AU$745m) in 2020. While plant-based milk gains momentum, the majority of Brits still consume cow's milk with sales of cow's milk reaching £3.2 billion (AU$6bn) in 2020.

"While almost 90% of Brits use cow's milk, usage continues to be lower amongst younger Brits than older age groups, as it faces intense competition from plant-based varieties. If they retain their plant-based milk habit as they age, this stands to drive usage across the population upwards over time, fuelling long-term growth for the plant-based milk category."

Filtered milk success

Filtered milk, which stays fresher longer than standard milk, has also increased 32% in the UK between 2019 and 2020, with UHT milk also seeing a surge in usage, up from 14% in 2020 to 20% in 2021. Overall, chilled milk (milk that needs to be kept refrigerated) remains the nation's favourite milk format with usage standing at 92% of Brits.

McCormick to open headquarters in Melbourne in early 2022

Global manufacturer of spices and other flavourful products McCormick & Company Inc has announced plans to open a new state-of-the-art, environmentally friendly, multi-purpose head office in Mentone. Currently under construction, the facility is on schedule to provide a boost to manufacturing in Melbourne from early 2022.

The multimillion-dollar complex will house the company's new Australian head office, which will also incorporate a state-of-the-art technical innovation centre, a logistics centre and new corporate offices. Over 90 staff will work at the facility, which will serve as McCormick Australia's innovation and collaboration hub for employees and customers.

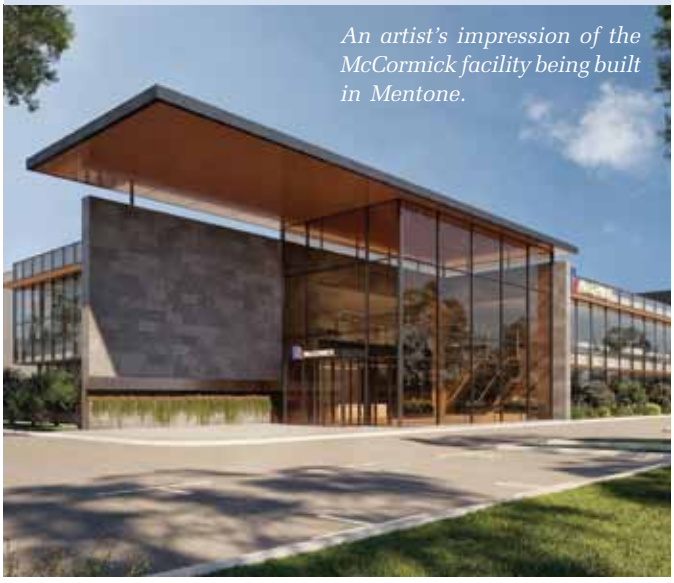
Managing Director of McCormick Australia, Paris Golden, said, "Like all McCormick's operations globally, we are committed to delivering industry-leading financial performance while doing what is right for people, communities, and the planet.

"We extend our thanks to our developer partner, Goodman, and building partner, Texco, for bringing this vision to reality."

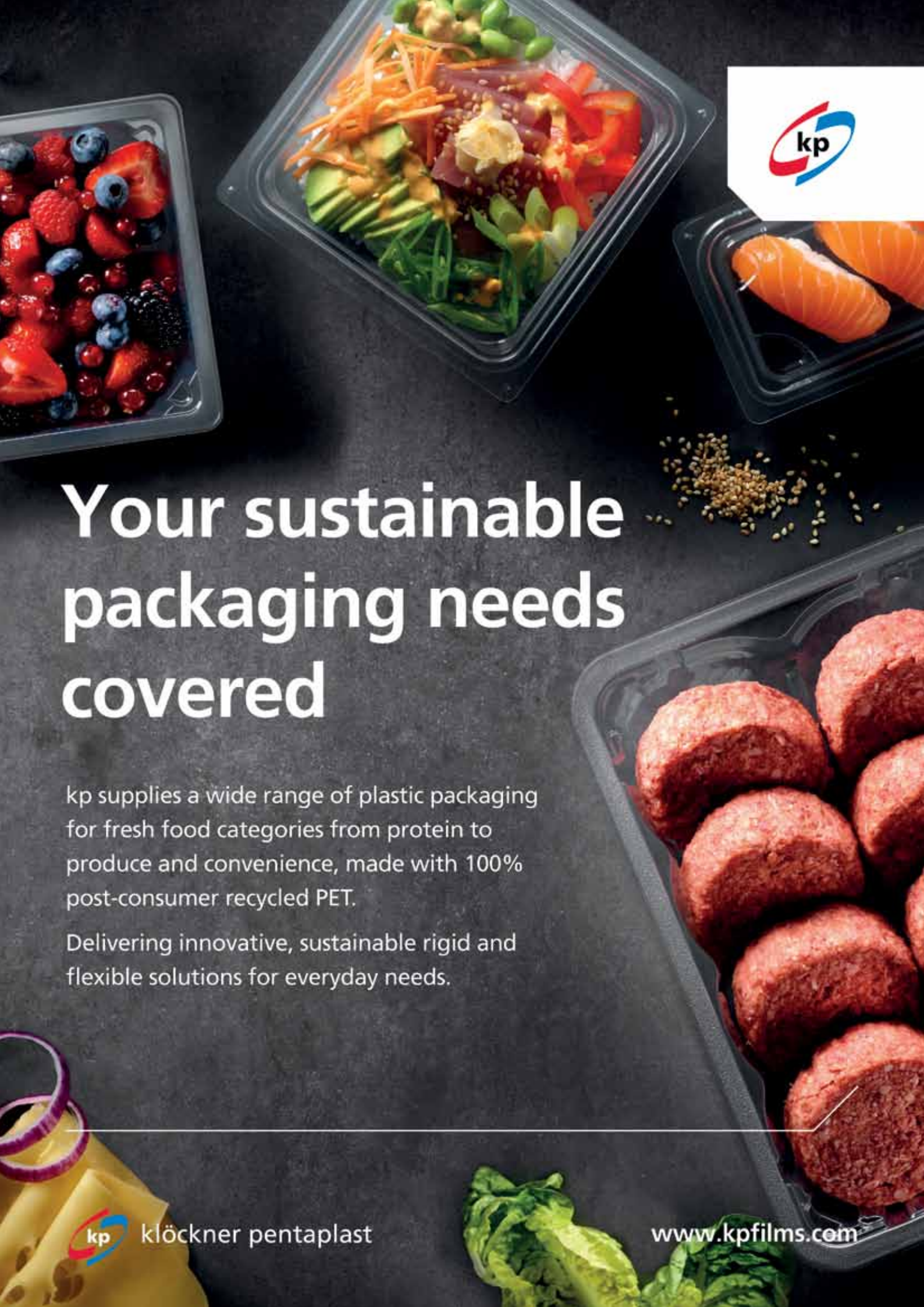
Features of the new facility will include:

- the use of solar power generation, thermally efficient glass, solar roof panels and efficient energy systems to ensure the site has minimal impact on the community and environment;
- a new logistics centre will include a mega-canopy to expand the number of trucks the warehouse can accommodate. This space will increase the efficiency of loading and unloading trucks and provide a safe environment regardless of weather conditions;
- a design to meet the FM Global high protection rating, which is higher than the Australian Safety Standards in food safety and quality;
- next-generation office spaces with a people-centred design approach to allow employees to be their best at work.

Designed to achieve a 5-Star Green rating by the Green Building Council of Australia, the facility will deliver fewer greenhouse gas emissions, use less electricity and water, and send less waste to landfill.



An artist's impression of the McCormick facility being built in Mentone.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Chobani's expansion in Australia

US food maker Chobani has found an enthusiastic market for its yoghurt brand products in Australia. Now the company is expanding in the plant-based category by investing in local manufacturing capabilities for oat-based products, with some help from Austrade.

Chobani first entered the Australian market back in 2011 when it bought Victorian dairy company Bead Foods, the producer of Gippsland Dairy yoghurt. It then proceeded to triple production capacity and increase staff and services at the Dandenong South facility.

"We were making 25,000 cases a week when we first started producing Chobani," said Lyn Radford, Chobani Australia Managing Director. "Today, we are producing more than 50,000 cases a day across all our ranges."

Chobani is now expanding its Victorian operations adjacent to its current site. The new facility, which is scheduled to open in mid-2022, will consolidate four production and logistics plants and offices into one.

As Australia's largest dairy-producing state, Victoria is a good location for Chobani with its Greek yoghurt using a high proportion of milk in the production process, compared to other varieties.

"A great product starts with great ingredients," Radford said. "Australia has a wealth of riches in food quality. It's a goldmine of ingredients, especially high-quality milk.

"Food safety standards here are some of the highest in the world. There's a huge amount of trust in Australian-manufactured food products."

Expansion into the oat market

Chobani currently exports to Malaysia, Singapore, Thailand, the Maldives and China, and plans to expand its footprint with the help of Australia's network of free trade agreements (FTAs).

"Australia has so many great FTAs with the Asia-Pacific," Radford said. "The FTAs take away the cost of exporting — removing or reducing barriers, such as tariffs. We don't want to be an expensively priced niche player. Our aim is to supply better food for all people."

Chobani is now tapping into the worldwide trend for plant-based alternatives by investing in the manufacture of oat-based products in Victoria.

"Oat is our big player right now," Radford said. "Plant-based milks will allow us to move into other areas, like ice cream and drinks. There's big demand for non-dairy-based products in Asia. Local production means we can adapt and innovate quickly."

The new Dandenong South facility will include a high-tech research and development hub. "This scalability pathway is important for us from an innovation perspective. We feel confident innovating in a market like Australia because of its regulatory environment.

"Austrade is helping our growth aspirations across the region," Radford said. "The experts on the ground are a great resource. They let us know about government grants or legislative changes happening in the market. They helped us source oat suppliers in Australia."

Chobani has partnered with Australian property developer Aliro to build its new facility. "We had to get approval from the Foreign Investment Review Board," she said. "Austrade helped us navigate that. There were a lot of changes as COVID-19 hit."

Chobani sources locally made ingredients and packaging, where possible, for its all-natural, preservative-free yoghurts. It is passionate about strengthening the communities it calls home and making good food accessible to everyone.

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Compressed air is used to push powdered milk or cocoa powder along pipes. With oil-free air, you will avoid oil contaminant mixing with the powder and maintain the powder purity.

Cleaning air

Compressed air for cleaning bottles, packaging and moulding prior to filling. Oil in compressed air will contaminate the food containers and alter the flavour and odour of the end product, besides being a health hazard.

Air blowing, aeration

Compressed air is pumped into a liquid to boost its oxygen content. This is used, for example, in fish farming to oxygenate water in lower layers and/or oxidise the sediments. Oil contamination in the air will kill the fish and other fauna.

Fermentation

Compressed air supplies oxygen to bacteria during fermentation to produce food ingredients such as citric acid, wine and yoghurt. The presence of even small oil traces will affect bacterial activity, create a substandard product and contaminate the end product.

Food storage

In the air separation process, compressed air is broken up into oxygen and nitrogen. The nitrogen is then used to preserve foods in cans, in larger storage facilities and in maritime transport. The air must be 100% oil-free as the nitrogen comes directly into contact with the food. Oil will destroy the membranes in plants which are expensive to replace. Oil will also significantly reduce the life of nitrogen generators leading to costly replacement.

Cooling and spraying

Compressed air is used to cool down baked goods after they emerge from the oven. Contamination of the air spoils the end product leading to rejections and production losses.

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Next revolution in freezing food


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ARS scientists Cristina Bilbao-Sainz (right) and Roberto Avena-Bustillos demonstrate the use of isochoric freezing chambers. Photo: U.S. Department of Agriculture.

The global frozen food market is estimated to reach around AU$547 billion by 2027 so an efficient cold chain is of crucial importance to the food industry.

Currently, most frozen foods are stored under conventional industry-standard isobaric (constant-pressure) conditions at sub-freezing temperatures. However, this process can degrade the textural and nutritional quality of the food and comes at high cost in terms of energy usage and carbon emissions.

Shifting to a new food-freezing method, using isochoric food cold chain rather than isobaric, could make for safer and better quality frozen foods while saving energy and reducing carbon emissions, according to a new study by U.S. Department of Agriculture's Agricultural Research Service (ARS) and University of California-Berkeley scientists.

"A complete changeover to this new method of food freezing worldwide could cut energy use by as much as 6.5 billion kilowatt-hours each year while reducing the carbon emissions that go along with generating that power by 4.6 billion kg, the equivalent of removing roughly one million cars from roads," said ARS research food technologist Cristina Bilbao-Sainz. She is with the Healthy Processed Foods Research Unit, part of ARS's Western Regional Research Center (WRRC) in Albany.

"These savings could be achieved without requiring any significant changes in current frozen food manufacturing equipment and infrastructure, if food manufacturers adopt this concept," Bilbao-Sainz added.

The new isochoric freezing method works by storing foods in a sealed, rigid container — typically made of hard plastic or metal — completely filled with a liquid such as water. Unlike conventional freezing in which the food is exposed to the air and freezes solid at temperatures below 0°C, isochoric freezing preserves food without turning it to solid ice.

As long as the food stays immersed in the liquid portion, it is protected from ice crystallisation, which is one of the main threats to food quality in frozen foods.

"Energy savings come from not having to freeze foods completely solid, which uses a huge amount of energy, plus there is no need to resort to energy-intensive cold storage protocols such as quick freezing to avoid ice crystal formation," Bilbao-Sainz said.

Isochoric freezing also allows for higher quality storage of fresh foods such as tomatoes, sweet cherries and potatoes that are otherwise difficult to preserve with conventional freezing.

Another benefit of isochoric freezing is that it can also kill microbial contaminants during processing.

"The entire food production chain could use isochoric freezing — everyone from growers to food processors, product producers to wholesalers, to retailers. The process will even work in a person's freezer at home after they purchase a product — all without requiring any major investments in new equipment," said WRRC center director Tara McHugh, co-leader of this study. "With all of the many potential benefits, if this innovative concept catches on, it could be the next revolution in freezing foods."

UC-Berkeley biomedical engineer Boris Rubinsky, co-leader of this project, first developed the isochoric freezing method to cryopreserve tissues and organs for transplants.

Since then, ARS and UC-Berkeley have applied for a joint patent for applying isochoric freezing to preserving food. The research team is now developing the best applications for this technology in the frozen foods industry, especially scaling up the technology to an industrial level. They also are seeking commercial partners to help transfer the technology to the commercial sector.

This research was published in *Renewable & Sustainable Energy Reviews*.

Foodcare meters for pH Analysis

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CASE STUDY

Spiral cooling system boosts production capacity by a cool 70% for scone baker

Haywood and Padgett, producer of scones and bakery products for large UK supermarket chains, has seen a boost in production capacity after implementing Starfrost's spiral cooling system.

After a factory expansion at its Yorkshire site, the bakery was looking to increase its production capabilities and turned to Starfrost to develop a custom spiral cooler system. The system has two Helix spiral coolers, with a double drum that maximised production throughput thanks to its single continuous belt. The Helix spiral coolers also provided space-saving benefits, using the height of the factory while also maximising floor area. The spiral cooler design allowed the production line to be simplified with it being possible to load and unload the products from a low level without any high-level transfers between drums. This also led to a reduction in the scone's crumb losses.

The ambient coolers of the spiral systems allowed for a natural but controlled temperature reduction of the bakery production. This natural cooling means that the form and properties of the baked goods can be kept at an optimal level while also keeping costs low.

The solution also features a modular plastic belting system developed to reduce product movement, which is a critical requirement within the baked goods industry as proper positioning is essential. Additionally, this belting technology, known as Intralox DirectDrive, allows for the continuous operation of the spiral cooler thereby removing the need to stop production for cleaning.

"The Helix spiral cooler system has boosted processing capacity by a substantial 70%; we no longer have a bottleneck in our bakery, which allows production to run quicker and smoother. The Helix system also cools our products individually, which has positively impacted product quality and consistency. The impressive design of the Intralox DirectDrive removes product movement and preserves product shape of our bakery products as well as eliminating friction issues between the drum and the belt," said Andy Harrison, Project Manager at Haywood and Padgett.

Starfrost
www.starfrost.com

Cooling tower

Rapid, reliable cooling is critical to a variety of processes. Whether it's the brewing of beer, bottling of juices, treatment of products in a tunnel pasteuriser or flash pasteurisation — efficient cooling makes it possible to quickly continue with the product's further processing and ensure the product's good flavour.

The VapoChill cooling tower from Krones is designed to meet the cooling requirements in the beverage industry. Built on a modular principle, its design is based on Krones' tunnel pasteurisers.

The housing unit is made of stainless steel and is also available in the more chemically resistant V4A or AISI 316L stainless steel, on request. The tower packings, which are made of polypropylene, can optionally be treated with a biocide.

The cooling tower has a clean design and also provides good accessibility thanks to removable sidewalls and tower packings. Designed to reduce process water consumption, it also has adjustable control of the fan's speed based on the desired cooling temperature to avoid unnecessary cooling.

Suitable for any application where process water needs to be cooled, the unit does not have to be combined with another Krones system. It can also be used for applications outside the beverage industry that work with cooling water.

Krones (Thailand) Co Ltd
www.krones.co.th

Comprehensive Cold Supply Chain management at your fingertips with Americold

COVID-19 caused a very unexpected and rapid shift from restaurant service to retail as people stopped eating out and began eating at home as stay-at-home orders went into effect. Consumers rushed to supermarkets to stock up, depleting the on-site inventory that was stocked for regular operations. Shelves were emptied creating the illusion of food shortages. However, consumers had simply exhausted the local, on-hand supply of certain items and not the entire supply chain.

This placed the entire supply chain under immense pressure but all Americold customers had access to our i3PL comprehensive supply chain management tool during this stressful period.

Managing Director of Asia Pacific at Americold, Richard Winnall, said: "The i3PL Supply Chain Management tool meant that our customers were able to closely manage their stock levels and distribution flows out of our warehouses and into the supermarkets in a period that saw demands outstrip that of the busy Christmas period."

Americold is a global leader in temperature-controlled warehousing and logistics to the food industry, connecting food producers, distributors and retailers to the end consumers both locally and internationally. With 16 sites around Australia and New Zealand, Americold played an integral role in supporting the major retailers to get their frozen and chilled stock into the supermarkets.

Americold's i3PL Supply Chain Control System drives greater efficiencies into your operations. It's a one-stop source for real-time information on orders, inventory, KPIs, and more — all easily accessed through any web-connected smart phone, tablet or computer.

i3PL provides access to 40 different reporting options, creates customized alerts, allows you to place new orders or change existing entries, book pick-ups and deliveries with Online Appointment Scheduling, and place holds on specific inventory to control your supply chain and protect your brand.

The temperature-controlled food supply chain and Americold's diverse infrastructure is built to withstand changes in food demand and support our customers with full network wide visibility.

For more information from Americold about its Temperature-Controlled warehousing and distribution solutions — scan the QR code.

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Dairy industry applauds moo-ves to adopt traceability guideline

A new guideline for the traceability of dairy in the supply line has been launched by Senator Susan McDonald.

The release of the Australian Dairy Traceability Guideline has been applauded by GS1 Australia and Australian Dairy Farmers (ADF), who have been pushing to increase transparency of information in order to counter what has been identified by the Australian Competition and Consumer Council as a power imbalance between farmers and dairy processors.

The traceability guideline outlines a standardised approach for the Australian dairy industry to track and identify product as it runs through the supply chain. Information gathered would then be distributed through a network using a distributed ledger system. The guideline has been developed with advice from GS1 Australia, as well as a series of industry supply chain workshops and validation with a global food company.

"Openly sharing information also helps industry to protect our clean, green and safe food image, and, importantly, reduce our costs to compete more aggressively in local and global markets. Without open, transparent and secure information systems in our value chain, Australia's dairy farmers, processors and exporters will be competing on world markets with one arm behind their back," said ADF President Terry Richardson.

Australian Dairy Farmers is planning to use a blockchain-based traceability system; the blockchain is one of the primary components of cryptocurrencies but instead of being used here for the creation of a modern internet currency, it is to be used to track information without any party having complete control over it. This should result in a highly transparent system that ultimately saves money for anybody using it, in addition to allowing for ease of use.

Electric forklifts

The Mitsubishi 4-wheel battery electric counterbalance forklift range continues to expand.

The latest addition of the FBCB series offers a choice of 12 models with an updated, modern-looking design and capacities ranging from 1000 to 5000 kg.

With a wide variety of optional features and a waterproof rating of IPX4, the new range of FBCB forklifts will provide users with an electric truck that will work across all platforms of light- and heavy-duty work cycles. A range of battery and charger options including lithium power is available within the product range where solutions can be tailored to suit user applications.

Even throughout long shifts, drivers can stay comfortable in the spacious and ergonomic driver compartment. With a narrow dashboard, high-visibility mast, small steering wheel and optimised lever placement, all-around vision has been maximised for safety without compromising on control.

With a low centre of gravity, electric hydraulic power steering and curve control, the FBCB series allows for increased operator confidence when travelling, cornering and lifting with intuitive speed control. The forklift is designed to keep travel consistent on inclines, responding as if it were driving on a flat surface.

Features include a choice of operation modes, which can be adjusted to meet the driver requirements associated with the operator's skill level, workplace conditions and operator's preferences.

An additional ECO mode can be selected to make energy consumption even more efficient, extending working hours per charge (up to 11.5 h) while also reducing running costs. If the forklift is left idling with no operation for 15 min, an auto power-off comes into effect further conserving energy.

While the base model is suited to many different working situations, a wide choice of options and attachments is available, allowing the truck to be precisely specified to meet the user's needs. PIN code entry can be enabled at an administrator level to allow tight control over who can operate the fleet and adjust the operational characteristics.

MLA Holdings Pty Ltd

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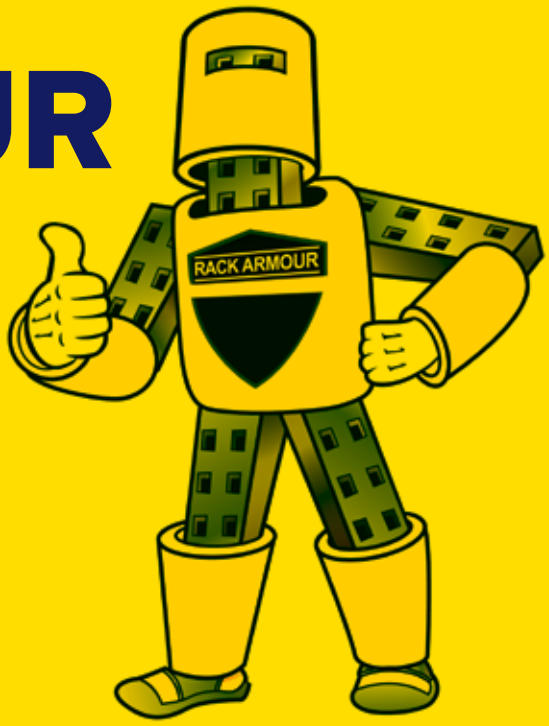

Rack Armour is the simple superior solution to pallet racking damage caused by forklifts.

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AUSTRALIAN MADE AND OWNED

How IoT improves supply chain sustainability

It comes as no surprise that the world has been pushing for more energy-efficient options in all facets of life. From transportation, retail and agriculture to consumer goods and services, the threat of climate change and rising energy costs have forced organisations to double-down on their efforts to cut greenhouse gas emissions.

Although these pushes for supply chain sustainability are sometimes framed as a way to appease the general public, the truth is that implementing and improving sustainability initiatives benefits an organisation's bottom line, both in the short-run and the long-run.

It has also never been easier for a supply chain to implement sustainable plant engineering practices. With recent advances in IoT technology and enhanced connectivity being embraced across industries, supply chains can use their existing IoT sensors and network capabilities to push their sustainability efforts, all while seeing increased ROIs through continuous improvements. This is sustainability that goes beyond just having notable corporate social responsibility.

Here are some of the benefits that IoT technology brings to a supply chain's sustainability:

Increased fuel and energy efficiency for logistics operations

It costs money to move goods and supplies around. The average 18-wheeler truck costs over $1400 (US$1000) to fill up on diesel fuel. Planes can often reach the $14,000 (US$10,000) per fight. When vehicles are out on the road, businesses need to know where they are at all times, and how they can make transit routes as efficient as possible.

With the right IoT technology in place, trucks can be rerouted for new deliveries while still on the road, deliveries can be optimised so that vehicles use less fuel and real-time analytics can allow a company to estimate fuel costs well in advance and make changes as they see fit.

These gains go beyond truck fleets and cargo planes. With inventory management software and integrated IoT sensors, forklifts can also be used more efficiently in a warehouse or freight yard, with operators being able to locate pallets and shipments with real-time tracking. This reduces the amount of time spent driving around just looking for the right materials to move. On average, forklift operators have been able to move up to 30% more freight within a regular work shift hour, all while saving on fuel costs.


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The less time vehicles are out on the road per shipment, the more money an organisation is saving. With a connected fleet of cargo vehicles, supply chains can reduce their carbon footprint while increasing their profit margins through energy savings.

Increased efficiency in manufacturing operations

Downtime is a productivity killer for a supply chain. No matter if it's malfunctioning factory equipment, a delayed cargo shipment, a miscalculation in inventory or a supplier mix-up, downtime grinds production to a halt and employees are left to wait on standby.

By harnessing IoT technology, these downtimes can be predicted within a supply chain before they affect operations, and resources can be diverted to address the problem quickly and efficiently. AI can predict that a conveyor belt will require maintenance in the near future, and the repairs can be scheduled during off-hours. Employee shifts can be scheduled accordingly while workers and supplies are diverted to another factory so that the supply chain continues to operate smoothly.

Predicting these types of supply chain disruptions allows businesses to better allocate resources that prevent increased costs and wasted resources.

Better inventory forecasting, less waste

Storing merchandise is a cost that many companies have grown to accept. That doesn't mean they don't stand to gain from being more sustainable in their warehousing practices. From e-commerce merchandise to dangerous goods to materials that require refrigerated storage, merchandise that sits around a warehouse is money being spent.

This is where IoT can help a supply chain using digitisation. Supplies spending an abnormally long time in a warehouse is usually because of one of two factors:

1. Miscalculations in required inventory that result in excess product that outweighs demand.
2. Poor logistics tracking that leads to merchandise being misplaced or lost within the inventory system.

These can both be addressed using IoT technology and PIM software. With a connected network, a supply chain can track a shipment along every step of its journey and automate alerts for warehouse inventories. With an integrated PIM system in place that can categorise different types of shipments, an employee will be able to find what they're looking for within any warehouse, have it shipped to their location and alert other departments about that specific shipment being reserved.

IoT technology also allows global supply chains to take advantage of inventory forecasting software, which can reduce overproduction of goods. Using predictive analytics, an IoT network can track how many units have been sold at specific locations and adjust inventory based on the volume being sold. Over time, AI can even predict when outside factors such as seasonality and purchasing cycles will affect sales and adjust inventory volumes automatically, reducing waste and energy costs that arise from transporting merchandise and manufacturing operations.

A connected IoT network can also better predict and calculate the required inventory needed for a specific part of a supply chain and adjust production to meet demand levels. This reduces warehousing costs and wasted raw materials in a cohesive manner.

Reduced food waste and spoiled goods

Food manufacturing has a unique supply chain. On top of the usual challenges that are par for the course in a supply chain operation, food manufacturers have the added challenge of working against the clock in trying to get goods from the plant to grocery retailers as quickly as possible before they perish.

Food spoilage is a major issue. On average, 1.3 billion tonnes, or 1/3, of all food products are wasted each year. In a world where consumers are demanding fresher nutrients and pushing back against the use of untested preservatives, there is a lot of work to be done to reduce the level of waste.

Using IoT sensors on shipping containers and trucks, an agricultural supply chain can keep track of which deliveries must be delivered first and by which date. A refrigerated container can automatically detect when temperatures are too high and alert personnel immediately. Inventory forecasting allows grocers and distribution centres to accurately estimate how much inventory a grocery store can feasibly handle at a given moment and what their regular sales capacities are.

Even food safety measures can be improved with IoT technology. On average, there are hundreds of global outbreaks of *Listeria* every year, with food products being recalled rapidly. A major challenge within food supply chains has been pinpointing which exact products are infected and need to be recalled. To be safe, manufacturing dates are used to pinpoint which batches of food products might be infected and have them recalled.

With the advent of factory automation within food processing facilities, where every conceivable metric can be measured and tracked, a *Listeria* outbreak can be caught more quickly and with greater precision. Instead of scrapping an entire crop as a safety precaution, a contaminated batch of food products can be traced back to their origin point with greater precision. With more data at their fingertips, food plant managers and industrial engineers can reduce the amount of food product that needs to be destroyed when a recall is issued while still exceeding safety protocols.

With rises in production costs and increasing scrutiny from the public to achieve carbon emissions targets, business leaders are under more pressure than ever to improve global supply chain sustainability within their operations. With the help of IoT technology, efficiency and productivity can be achieved in synchronous fashion as businesses continue to push forward towards a greener future.

For more on IoT technology and how it helps the F&B and manufacturing industries improve sustainable supply chain management, visit https://www.se.com/au/food-and-beverage.

Schneider Electric
www.se.com/au

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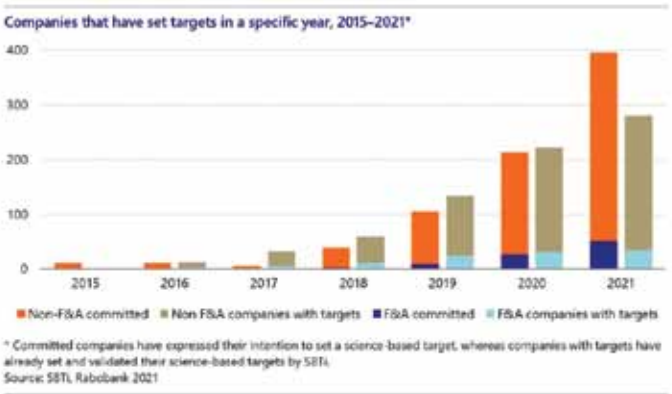
Food industry suppliers take note of Scope 3 emissions focus

Major food companies such as Nestlé, Mars and Danone have communicated their intention to actively reduce the Scope 3 emissions of their business, and many have 2030 targets. Are the commitments made by these companies just a drop in the ocean, or can we expect a serious shift in the sector?

Rabobank has now produced a report called 'Deadline 2030: Slashing Value Chain GHG Emissions by a Third' that outlines how the focus to Scope 3 emissions has far-reaching implications for the food value chain as a whole.

Many food manufacturers are now recognising that their Scope 3 emissions (emissions from the supply chain — including the production of purchased goods, transport, waste disposal, etc) account for more than 90% of total emissions for an average packaged food company. As such, suppliers can play a crucial role in emission reduction — those who can measure their emissions and have a reduction plan in place can benefit, while those who do not act will be at risk of being replaced.

Target-setting by food companies has grown exponentially for the last few years, particularly for Scope 3 emissions. Up to the beginning of August 2021, 1685 companies had committed to take action, 841 of which have set approved science-based targets. For some packaged food subsectors like breakfast cereals or confectionery, more than 40% of the sector in terms of 2020 retail sales has set Scope 3 reduction targets. On average, these companies aim to reduce one-third of their value chain emissions by 2030.



"As purchased inputs such as food ingredients and packaging account for the majority of Scope 3 emissions, collaboration with the value chain is key to making a sizable reduction happen," explained Marjolein Hanssen, Analyst – Consumer Foods at Rabobank.

So far, most food companies have made minimal or no progress on their Scope 3 targets. "In order to accelerate progress, the input and cooperation of suppliers is vital," Hanssen said. By engaging with their off-takers, suppliers could prevent them from switching to a supplier with better insight into emissions or with an existing reduction plan, even benefiting from the movement to lower emissions.

According to Hanssen, once a serious portion of a sector commits to reducing Scope 3 emissions, staying out of the discussion as an active company in that sector or a supplier to that sector becomes increasingly difficult. At some point, there will be more off-takers asking suppliers about their emissions than not. This has far-reaching implications for the relationship between supplier and off-taker, as well as the level of transparency needed all the way back to the farm.

Most strategies to reduce these types of emissions include regenerative agriculture, product reformulation, alternative sourcing locations, sustainable packaging, innovation in agricultural practices/ingredients and offsetting emissions. This naturally influences suppliers of big food companies, but they can use this shift to their advantage if they take proactive action.

"The relationship between suppliers and off-takers is already changing. Instead of an open market model based on supply and demand, the dynamics will likely shift to more intimate, long-term relationships with more transparent supply chains," Hanssen said. The three reasons for this shift are the financing support that many of the suppliers will need from the off-takers to face the costly emission reduction initiatives, the knowledge exchange that will take place in the form of combined research programs or knowledge projects between the off-takers and the suppliers, and the data exchange needed to accurately measure emissions and track reduction over time. All this involves long-term relationships between both parties.

The full report on the importance of monitoring, controlling and cooperating on the reduction of Scope 3 emissions is available from Rabobank.

Tim Symons
Packaging Manager, Tooheys

Supply Chain of the Future

Dematic AGVs help keep the beer flowing at Tooheys Brewery.

When Lion Beer Australia started thinking about what its supply chain of the future might look like, they knew they needed to improve productivity to keep up with demand, and adopt processes and technologies that would deliver optimum services for Lion's people, brands, production facilities and suppliers.

The fleet of Dematic AGVs at Tooheys are helping achieve just that — giving Lion dependable seamless performance for its end-of-line process, keeping product moving accurately and safely to the end consumer.

See the video and read the full story at Dematic.com/lionbeer

Scan to watch the video!

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DEMATIC

Dust collectors

Camfil X-Flo Dust Collectors are suitable for use in various food processing applications using flour, finely ground spices, seed processing and sugar refinement.

The Gold Series X-Flo dust collector performs well in applications where dry materials are batch mixed, conveyed and processed. It offers high performance, a modular design, ease of service and an optional bag-in, bag-out filter change-out. Constructed from heavy-duty carbon steel to meet the demands of user applications, the dust collector is durable for long-term operation.

Coupled with Camfil Gold Cone vertical cartridge technology, the Gold Series X-Flo offers greater pulsing of high-loading dust whilst maintaining a low pressure drop for energy savings. Modular design provides a variety of configurations to enable custom solutions for users' individual requirements.

Camfil Australia Pty Ltd
www.camfil.com.au

Stainless panel PC series

The Winmate IP69K Stainless Steel Projective Capacitive Touch Panel PC Series supports a corrosion-resistant and IP69K-rated housing made of stainless steel SUS 316/AISI 316. The product is suitable for food and beverage automation. It is water and dust resistant and designed to survive splashing conditions during stringent clean-up processes, meeting strict hygiene demands.

Furthermore, the panel PCs feature M12 connectors, a fanless cooling system and ultra-low power consumption, as well as various connectivity options that are designed with industrial applications in mind. Also, the IP69K series facilitates a range of screen sizes to meet individual needs (10.4″, 15″, 19″, 21.5″ and 23.8″).

Likewise, the IP69K Stainless PCAP LCD Panel PC Series has plenty of I/O ports, including USB 2.0, RS232 and RJ45-10/100/1000 LAN, to provide connectivity and compatibility. These panel PCs support intuitive user controls with projected capacitive multi-touchscreen, including zooming, tapping and scrolling.

Key features include SUS 316/AISI 316 stainless steel; full IP69K waterproof enclosure; corrosion resistance; and a true flat, easy-to-clean front surface with edge-to-edge design.

The product also has plenty of I/Os, including USB 2.0, RS232 and RJ45-10/100/1000 LAN; waterproof ports with adapter cables for external connectivity; support VESA/ YOKE mount; support glove/ rain mode; and a wide range of screen sizes. Sizes include 10.4″, 15″, 19″, 21.5″ and 23.8″.

Backplane Systems Technology Pty Ltd
www.backplane.com.au

Access platform line

Flexicon has introduced a line of anti-slip access platforms to reach elevated process equipment safely, eliminating the need for ladders, scissor lifts and forklift cages.

The modular system includes braced frames which can be bolted to the floor, 1220 mm square deck sections and stairways with elevations up to 2.4 m.

Upper grab rails and mid-height rails bolted to stairway stringers and deck perimeters, together with auto-closing hinged safety gates and anti-slip grating on treads and decks, are designed to maximise personnel security.

Modularity allows stacking of frames to attain high elevations, and joining of decks in 1220 mm square increments to create elevated walkways and extended mezzanine areas in shapes conforming to equipment configurations and plant layouts.

Control panels can be mounted to the braced frame, allowing operation of equipment at various elevations.

Flexicon Corporation (Aust) Pty Ltd
www.flexicon.com.au

Complete flooring projects

Many flooring projects involve multiple aspects that require a large number of different contractors for completion. On top of the main flooring installation, there will often be drainage, panelling, line-marking, barrier installation, and so the list goes on. Coordinating all these project aspects can be challenging, particularly keeping everything running to the tight schedule.

Working in the food and beverage manufacturing industry for over 12 years, Allied Finishes understands the importance of adhering to the tight timelines and achieving 100% food safety compliance. The company has a suite of fully trained and qualified people who work with them to provide products and services related to flooring. It has quality assurance systems in place to ensure the project will be completed to the highest standards.

With flooring being the primary installation, the company coordinates all the other aspects to be completed after the flooring, within the specified timeframe. To streamline communication and make it easy for the customer, a dedicated senior project manager is assigned to each project as one key point of contact for everything related to the flooring project.

Updated 01/10/2021

Allied Finishes

www.alliedfinishes.com

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Smith's Snackfoods

installs large-scale bulk handling system for new chip line

The Smith's Snackfood Company began manufacturing potato crisps (chips) in Australia in 1931 and was the first to offer flavoured crisps in Australia. Today, as a unit of US-based PepsiCo, its brands include Twisties, Burger Rings, Doritos and Parker's pretzels, as well as reduced-fat products such as Sakata rice cakes, and Sunbites Grain Waves whole grain chips and Sunbites air popped popcorn.

In January 2019, Smith's installed a process line to manufacture Smith's Oven Baked potato chips, which contain 50% less fat and have been designed to have more crunch and texture than traditional fried crisps.

For the powder handling and blending portion of the new line, Smith's worked with Flexicon Corporation Australia. Due to the size and scope of the new system, the supplier's Project Engineering Division (PED) handled much of the design and specification work.

Upstream batch and downstream continuous processes

The new powder handling and blending system consists of two upstream batch processes that feed a downstream continuous process.

In one batch process, major ingredients received in bulk bags are dispensed by weight from two Bulk-Out model BFC bulk bag dischargers supplied by Flexicon. Installed facing one another, the matching dischargers are each equipped with an electric hoist and trolley that travel on an I-beam common to both frames, allowing bulk bags to be loaded from a single floor location.

The dischargers are each equipped with a Spout-Lock clamp ring atop a Tele-Tube telescoping tube that applies continual downward tension as the bag empties and elongates, directing material through the bag spout. The sealed systems of both dischargers are vented to a dust collection system installed in an adjacent room, preventing contamination of the plant environment.

Flow-Flexer bag activator plates raise and lower opposite bottom edges of the bags on timed cycles, ultimately forming a steep 'V' shape that promotes total discharge. Both are also equipped with a Power-Cincher flow control valve in which contoured stainless steel rods cinch the bag spout concentrically, allowing dust-free retying of partially empty bags.

When a batch is initiated, the rotary airlock of either discharger begins metering material into a common pneumatic conveying line leading to a Flexicon filter receiver suspended on load cells. Weight gain information is transmitted to the system controller that runs the airlock valve at high speed, then at dribble feed rate which, together with programmatic compensation for material in-flight, achieves precise batch weight accuracy.

Once major ingredients are batched in sequence from bulk bags, pre-weighed sacks of low-volume ingredients are positioned using a 25 kg vacuum sack lifter, and dumped manually through a Flexicon bag tip station with integral dust collector and rotary airlock valve feeding the same pneumatic conveying line. A chute through the sidewall of the bag dump hood leads to a Flexicon bag compactor with pneumatic ram that compresses up to 150 bags into a plastic-lined container for dust-free disposal.

The batch accumulated in the filter receiver is then gravity discharged into a paddle mixer. Blended batches are discharged into a Flexicon buffer hopper that is sized to provide a continuous supply of material to the downstream process through a second pneumatic conveying system and filter receiver.

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In a separate batch process, a Flexicon bag tip station — also with integral dust collector, compactor chute and rotary airlock valve — is dedicated to manual additions of pre-weighed, pre-mixed inclusion ingredients. Positioned adjacent to the first bag tip station, it shares the same bag compactor, but meters material into a third pneumatic conveying system and filter receiver.

The second and third filter receivers are suspended on load cells that signal the system controller when to convey additional blended material from the buffer hopper, and from the second bag dump station respectively. These rotary airlock valves provide material on an as-needed basis to a pair of loss-in-weight (LIW) gravimetric feeders, which allow rapid changing of screws to suit material flow characteristics, at throughputs from 4 to 400 kg/h. The overall arrangement allows the LIW feeders to provide an uninterrupted supply of material to a new continuous mixer at precise ratios and rates, completing the powder handling and blending portion of the new Oven Baked potato chips line.

Managing lockdowns and logistics

Flexicon's Project Engineering Division recommended equipment specifications, coordinated multiple equipment manufacturers and developed a controls and automation package for the bulk handling system that integrates with Smith's overall process control system. For parts to be imported, the supplier obtained special exemptions to COVID-19 restrictions on crossing state borders.

"We had an aggressive schedule to get the new production line installed and commissioned on time and we ran into numerous challenges as a result of the COVID-19 pandemic," said Nayantha Abeysiri, PepsiCo project manager. "However, Flexicon found solutions to those challenges while staying on budget to get the equipment manufacturing completed on schedule.

"The equipment design is efficient, hygienic, simple, and meets all EHS requirements and food safety standards," he said, adding that Flexicon is in the design phase for another project.

Flexicon Corporation (Aust) Pty Ltd
www.flexicon.com.au

Bulk bag dischargers meter major ingredients by weight into a pneumatic line. Bags are inserted and removed using a cantilevered I-beam, hoist and trolley.

CASE STUDY

Lactalis Australia increases AGV fleet

Building on its initial deployment of four Dematic automated guided vehicles (AGVs), Lactalis Australia, part of global dairy producer Lactalis, has invested in an additional AGV for its fleet at its Lidcombe Milk Site in NSW.

With the addition of a fifth AGV to operations, Lactalis is now able to expand automation to more areas within the warehouse. All five AGV units will work cohesively together, with the flexibility for each of them to operate within different areas of the warehouse to retrieve products ready for dispatch.

"Dedicated to investing in and growing the Australian dairy industry, as well as promoting Australia as a high-quality producer for the Asia–Pacific region, this transition into site-wide automated operations with AGVs has helped Lactalis to significantly streamline our operations," said Kristian Brennan, National Logistics Optimisation Manager at Lactalis. "After already experiencing major improvements to productivity with our initial adoption of Dematic's AGVs in 2019, this new addition to the fleet will allow us to further automate our operations in both inbound and outbound zones within the warehouse."

The fleet of AGVs works to retrieve pallets from an inbound conveyer system from production, and then feed the pallets into an order buffer, releasing the pallets at a declined angle onto pallet live storage racking. AGVs are capable of operating 24/7 in both small and large spaces and managing tight traffic at speeds of up to 1.7 m per second.

The AGVs manage the transportation of pallets of milk at the Lidcombe site and are capable of lifting loads of up to 1.2 tonnes to a height of six metres. Additionally, the AGVs are well suited to working at the site's chilled environment, which has a temperature of just 2 to 4°C.

AGVs are an innovative automated solution that use sensors and laser scanners to navigate with precision for safety around workers and any obstacle. They are powered by lithium-ion batteries and can drive themselves onto charging floor plates at times of inactivity to be fully charged in just 2 h.

"Lactalis is a fast-growing company in Australia, and now with a complete fleet of AGVs, they are able to automate several areas of the warehouse, which allows them to optimise picking and dispatch operations across the board," said Tony Raggio, General Manager AGVs at Dematic.

Dematic Pty Ltd
www.dematic.com.au

Mobile industrial robot

Konica Minolta Australia has announced the availability of the MiR250 mobile industrial robot, through its partner Mobile Industrial Robots (MiR).

Simple to set up, the autonomous mobile robot (AMR) has a smaller footprint and increased adaptability. This can help to optimise internal logistics without changing layout in industries such as manufacturing, FMCG and defence.

With a footprint of 580 x 800 mm, the AMR is only 30 cm high and can move up to 250 kg at speeds of 2 m/s.

The AMR also has a fast charge rate of 0–80% in 1 h with an operating time of 13 h at full charge, and has the ability for a fast battery swap to support 24/7 operation.

Top modules can also be mounted on the robot to provide a complete solution to tow carts and shelves and lift and transport shelves.

The AMR signals with light and sounds to demonstrate its status. The LED light band indicates its current operational state such as emergency stop, mission paused, path blocked or mapping. It also has signal lights that work similarly to lights used on cars: white at the front, red at the back and indicating a left or right turn by blinking. Signal lights suggest the immediate motion plans by signalling forwards, backwards, braking and left and right turns.

Konica Minolta Business Solutions Australia Pty Ltd
www.konicaminolta.com.au

SteriFloor addresses issues around antimicrobial surfaces in manufacturing

Flooring specialists, Allied Finishes, have spent the past two years working on a new product that sterilises production floors without creating a slip hazard — SteriFloor.

Allied Finishes recently received an ISO 22196 certification for SteriFloor, the new antimicrobial suite of flooring solutions developed by the company.

The ISO 22196 certification specifies a method of evaluating the presence bacteria on antibacterial-treated plastics and other product surfaces and requires a standard review every five years.

A few key factors make the certification of extra value to those who obtain it, firstly the method is quantitative so the results can be reproducible, which in turn should increaser confidence in the product.

The method, which is quite flexible, also tests for both growth inhibiting bacteria and bacteria-killing properties in the product.

SteriFloor was designed to create an antimicrobial surface in food and beverage manufacturing while adhering to WHS by not creating a slip hazard, something which plagued earlier attempts.

Allied Finishes suite of solutions is currently at six since completing the research and development phase with the help of scientists and a willing client.

The new surface solution combats bacteria build up while mitigating slipping hazards.

While flooring is recognised as being passively antimicrobial because bacteria growth isn't made easier, the floors don't necessarily actively combat it, until now.

A research intern, Jayanti Arun Mendhi, joined the company in 2021 to analyse and test the range against current flooring.

The client agreed to take part in the testing and Mendhi visited the site on two occasions to better understand the problems which needed solving.

"I had informative conversations with the clients to explain to them how antimicrobial coatings work and how improvements in technology could benefit their factories," said Mendhi.

"The two main objectives were to improve on existing coatings with antimicrobial properties by testing coatings prepared with antimicrobial technology, and secondly to research about problems faced by the food industry in relation to floorings, identify some of the less commonly understood problems and suggest improvements."

Through her research Mendhi confirmed SteriFloor was among the best antimicrobial technology on the market.

As well as testing the product against competitors, Mendhi also conducted microbial tests comparing a SteriFloor sample to an untreated polyethene cement sample.

"The existing antimicrobial coatings were tested by ISO standard tests and relevant reports were prepared," said Mendhi.

"Along with this, microscopy imaging was done to visualise samples with and without bacteria to better understand the existing and optimised products."

Mendhi then prepared an educational report on her findings for the clients to better understand its advantages.

"Along with this, factory visits to the food factories assisted in understanding the needs of the clients and the problems faced by them in the food factories," said Mendhi.

"Extensive research was done through research databases to acquire more knowledge about some of the less commonly understood problems of the food industry."

The result which helped seal the release of SteriFloor came when, after two years, a site which employed the technology saw no bacteria growth on its floors for the entire duration.

This created confidence in SteriFloor solving a problem which has plagued the industry for some time.

ALLIED FINISHES

Allied Finishes
www.alliedfinishes.com

CASE STUDY

Nut processing facility improves yield using new sorter

US food manufacturer, Caro Nut Company, processes and packages a variety of dry roasted, oil roasted or pasteurised raw snacking nuts, nut butters and ingredients for major brands, private label customers and industrial food processors.

Caro Nut recently selected Key Technology's VERYX BioPrint sorter for its nut butter line. The new technology is designed to remove more shells, foreign material (FM) and product defects, all while increasing yield.

Gerard Lorenzano, Plant Manager at Caro Nut said: "Before we replaced our old sorter, we had to sacrifice a lot of good nut meat in order to get the shells out. It took a lot of time and effort to re-sort the rejects and recover yield.

"All that changed with our new sorter. VERYX BioPrint removes exactly what we want and nothing more... This powerful technology has improved our product quality at the same time it's increased our yield by more than one metric ton of product a day."

Combining hyperspectral imaging with colour cameras, the sorter is designed to inspect across a range of wavelengths within the near infrared (NIR) spectrum as well as visible light to analyse a richer data set about the materials it's sorting. Data from the hyperspectral sensors and colour cameras is fused at the pixel level using Key's Pixel Fusion technology, producing a unique 'signature' for each material substance to detect the chemometric and biologic properties of objects. The nut sorter finds and removes a wide variety of FM and even hard-to-detect defects, such as nuts with insect damage, rot and mould, without false rejects, regardless of incoming defect loads, while also shape sorting and colour grading.

"Detecting shells is difficult for traditional laser/camera sorters because, when shells are the same colour as good nut meat, it can trick the sensors. VERYX BioPrint uses hyperspectral technology to look at the moisture content of objects. It sees low moisture in shells and kicks them out," explained Sonny Chhina, Maintenance Supervisor at Caro Nut. "This sorter is so effective, we've eliminated manual inspection on the line and moved that person to elsewhere in our plant."

"We're able to handle heavier loads of incoming shells and defects with this hyperspectral sorter," Chhina added. "We start by selecting the product recipe from the sorter's memory. If the incoming load is very heavy, we may need to adjust the sensitivity of the settings a little, but that's easy to do with just a couple of taps on the touchscreen. Then we're good to go."

Caro Nut's VERYX BioPrint C140 features front- and rear-mounted hyperspectral sensors and high-resolution colour cameras. It can sort up to eight metric tons of cashews, almonds, macadamia nuts and other nuts per hour.

"We've connected our VERYX BioPrint to our plant network, which is a great asset for us," Chhina noted. "If we reach out to Key for support, they're able to jump on and work with the sorter remotely to help us maintain peak performance.

"We're tapping into VERYX's data collection capability as well. For example, our sorter is programmed to measure the attributes of the incoming product and its reject stream. We use that information to be sure we're ejecting exactly what we want to remove. We also give that data to our source managers so they can negotiate supplier payments based on incoming product quality."

Key Technology Australia Pty Ltd
www.key.net

What's the missing ingredient for for chocolate supply chains?

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A study from the University of Surrey has revealed that biotechnology could be the missing ingredient in helping cocoa farmers get a better deal for their beans.

Chocolate is an AU$114 billion-per-year global industry that has seen the volatile price of cocoa lead to a surge in traders seeking to buy cheaper beans, which has affected the prices and practices of legitimate farmers using sustainability practices.

In the findings, published in the journal *Supply Chain Management*, the multi-university research team reveal that biomarkers can create 'meta-barcodes', which are like biochemical fingerprints, an unchanging barcode extracted from the plant's DNA, providing a unique identifier of a plant that is also observed in its beans and subsequent chocolate products. The biomarker of cocoa beans used in chocolate manufacturing could accurately identify the farm, production facility or cooperative where a cocoa product came from.

To make this new process a reality, a controlled data set of biomarkers of registered locations is required for audit. The study goes on to explain that this missing piece — a biomarker database that identifies the origin of cocoa products — can be built by companies at an estimated cost of £5 (AU$9) per sample, which is around the cost of a box of chocolates.

Glenn Parry, Professor of Digital Transformation at University of Surrey, said: "The chocolate market has become turbulent, and we have evidence of over 100 years of slavery in the supply chain. Governments and chocolate producers are faced with an ethical challenge and drastically need to improve a trade that is rife with environmental destruction and human misery.

"We have an effective approach for them to make progress. We demonstrate that biomarkers can provide supply chain visibility from the individual farm to the retail chocolate bar. This solution could now be within reach, where the journey of the chocolate in your fridge could be traced back to the cocoa trees where it began."

Labelling seafood made from fish cells

While Australia has a Senate Inquiry into food labelling of plant-based meat, in the US a study has looked at what to call seafood made from fish cells.

According to a recent Rutgers study in the *Journal of Food Science*, terms such as 'cell-based' or 'cell-cultured' should be used when labelling and talking about seafood products made from the cells of fish or shellfish.

The U.S. Food and Drug Administration and U.S. Department of Agriculture require food products to have a "common or usual name" on their labels, so consumers can make informed choices.

With more than 70 companies around the world developing cell-cultured protein products and more than $360 million invested in their development in 2020 alone, the adoption of one common name is crucial as products move closer to commercialisation.

The study by William Hallman, a professor who chairs the Department of Human Ecology in the School of Environmental and Biological Sciences at Rutgers University-New Brunswick, confirmed the results from his earlier study comparing seven potential names for these products.

In the new study, a representative sample of 1200 consumers evaluated packages of Atlantic salmon designed to mimic those found in grocery stores, labelled with 'cell-based seafood' or 'cell-cultured seafood'.

The names were evaluated using five criteria:

- ability to help consumers distinguish cell-cultured seafood from wild and farmed fish;
- to signal its potential as an allergen;
- to be seen as an appropriate term for the product;
- to not disparage cell-cultured or conventional products; and
- to not evoke thoughts, images or emotions that the products aren't safe, healthy and nutritious.

"The results suggest that both 'cell-based seafood' and 'cell-cultured seafood' meet FDA regulations," Hallman said.

"They help the majority of consumers understand that the new products are produced in a different way from the 'wild-caught' and 'farm-raised' fish they may already be buying. At the same time, consumers also recognised that if they are allergic to seafood, they shouldn't eat the product.

"Both names work well. The key is to choose a single term and to get everyone to adopt it. That will reduce confusion and ultimately help consumers understand what they are buying."

Livestock processing facility to be built in South Australia

CirPro (Australia), formerly Pirie Meats, and Siemens have signed a memorandum of understanding (MoU) that outlines ways in which the two companies will cooperate in CirPro's design, development and implementation of a livestock processing facility in Port Pirie. Siemens is set to provide technological and infrastructural solutions that will assist in developing the facility with Industry 4.0 in mind.

"This MoU with Siemens means that we have access to knowledge across the broadest spectrum of technology with a single technology company. What I really want out of this is to develop a view of what's possible — and I can't think of another company that could deliver the breadth and depth of knowledge and technology offerings that Siemens can," said CirPro CEO Reg Smyth.

"Embracing Industry 4.0 is critical as we prepare our competitive place in the world. But when it comes to business, what's most important is the objectives such as speed, resource efficiency, flexible production, scalability, sustainability and so on. This is what drives competitiveness. When you look at this holistically against the technology solutions available today in digitalisation, automation and energy efficiency, you can achieve amazing outcomes. However, to really achieve maximum efficiency you need to include all aspects of the business end to end — everything from interactions with your supply chain to cybersecurity, smart building technologies and even types of skills needed to operate the plant," explained Jeff Connolly, CEO of Siemens Australia.

CirPro has committed to a circular processing model and the aims to reduce methane emissions from livestock with a seaweed diet supplement, hence the change of name from Pirie Meats.

"Embracing Australian innovation and advanced plant technologies from Siemens in this way is exciting, but will present challenges and require collective commitments to support an industry transformation that will create new market opportunities for Australian products, greater resilience and increased returns to farmers through to value-add product manufacturers. Siemens support for comprehensive digitalisation and traceability across this new supply chain will be fundamental to informing and protecting the quality, integrity, value and future growth of all products that come through our new facility," Smyth said.

Subject to detailed design completion and final Development Approval, CirPro is focused on commencing construction as soon as possible with processing commencing by early 2023.

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Schröder in movie

Natural preservative for cured meats

Researchers at the University of Reading and other scientists have been on the lookout for alternatives to nitrite in processed meat and now they have found an unlikely plant-based solution.

Japanese knotweed is a fast-growing plant, feared by homeowners for its ability to invade gardens and buildings. However, researchers have now found that this annoying plant contains a chemical which could take the place of the nitrite preservative in cured meats such as bacon and sausages.

The PHYTOME project has developed processed red meat that includes added natural substitutes, reducing the carcinogenic compound nitrite added to preserve meats. The range of sausages and hams had a mixture of plants and fruits added to them which included rosemary, green tea, and resveratrol — an extract taken from Japanese knotweed.

As well as developing versions of cooked and dry cured red meats which replaced nitrite with these natural alternatives, the project also tested whether those substitutes would have an effect alongside normal nitrite levels found in processed red meats.

In a paper published in *Molecular Nutrition and Food Research*, the international team of scientists have tested the specially formulated products against conventionally processed red meat as well as white meat.

They found that tell-tale signs of nitrite content in participants' faeces were significantly lower from both specially formulated meats, and levels were like those who were fed on minimally processed white meat.

Gunter Kuhnle, Professor of Nutrition and Food Science at the University of Reading, said:

"The ongoing worries about highly processed red meat have often focused on the role of nitrite, and its links with cancer. The PHYTOME project tackled the issue by creating processed red meat products that replace additives with plant-based alternatives.

"Our latest findings show that using natural additives in processed red meat reduces the creation of compounds in the body that are linked to cancer.

"Surprisingly, the natural additives seemed to have some protective effects even when the red meat still contained nitrite. This suggests that natural additives could be used to reduce some of the potentially harmful effects of nitrite, even in foods where it is not possible to take out nitrite preservatives altogether."

A major consideration for the team was how the nitrate content in drinking water can significantly affect the formation of nitrite, which is produced in the body, as found in previous research.

The team controlled for this by controlling water content during the trial and participants were tested with both low and high nitrate-containing water across separate testing periods.

By controlling for drinking water, the results showed that PHYTOME red meats produced lower levels of the tell-tale signs of nitrite production in the body than either conventional red meat, or the unprocessed white meat.

Sausage twist linker

The Mainca PR-360 attaches to a user's existing hydraulic filler and automatically portions and twists the filled casing to create linked sausages. Suitable for the small–medium sausage maker looking to fill, portion and twist at once, the device is designed to improve product quality, consistency and production efficiency, and removes the need for skilled labour.

It works with natural, collagen, polyamide or cellulose casings and is suitable for both fine emulsions and coarse minced products. Capable of up to 1 link per second, the device has no limits on portion size, length, weight, number of twists, or twisting speed.

It performs best with fillers that have a lever locking mechanism and a variable pressure control knob, as this allows for hands-free operation (when using collagen casing) and a consistent flow of product.

The device connects via the filler nozzle nut. It runs a single-phase motor (230 V, 50 Hz) but requires no electrical connection between it and the filler. Constructed in stainless steel 18/10 and polyethylene, it is fully compliant with EC regulations.

Barnco Pty Ltd

www.barnco.com.au

CASE STUDY

Wastewater pump for Junee Prime Lamb

Junee Prime Lamb is one of the leading producers of premium quality lamb in Australia. A family-owned and -operated business since 1997, the company specialises exclusively in prime Australian lamb, and supplies its products to many parts of the world.

Its lamb processing facility, which is located on the outskirts of Junee, occupies 182,000 m² and employs nearly 300 highly trained staff. The production line is equipped with the latest technology to maintain strict hygiene standards and the business regularly reviews its processes to ensure they meet the highest quality standards for the industry.

When Operations Manager Scott Newton needed a wastewater pump for the facility, he wanted to source the best and most reliable product for the job. Newton already had quite a lot of experience with Gorman Rupp self-priming pumps at another large NSW abattoir and because of their history of reliability, ease of maintenance and long service life [even when operating in very harsh conditions], he opted for Gorman Rupp pumps again in the Junee upgrade.

The team at Hydro Innovations offered a Gorman-Rupp T3A60S-B "Super T Series" self-priming solids handling pump.

It is capable of handling solids up to 63 mm and also stringy materials because of its "self-cleaning wear plate system". The pump also has a lightweight inspection cover-plate to allow quick access for operators to inspect pump internals or remove large pieces of debris. Being self-priming, it could be located at surface level, up to 7.5 m above the wastewater level.

The result

Newton has been very happy with his investment and firmly believes that buying quality equipment provides not only tangible returns in operational efficiency, but also intangible returns in peace of mind.

The Gorman-Rupp Super T Series range is available in sizes from 2" [50 mm] through to 10" [250 mm], with flows from 3 L/s through to 200 L/s. The range is also available in various materials of construction to suit specific applications, such as stainless steel components for corrosive wastewater and hardened components for abrasive fluids.

Hydro Innovations
www.hydroinnovations.com.au

CASE STUDY

Let the process flow

Producing large quantities of popular fast-food items such as chicken nuggets with consistent, repeatable results every time is a highly sensitive process. As leading global brands place increased emphasis on demanding specifications for product quality, this has become a fine art. Any marginal deviation on a production line can affect the quality, and it already starts at the basis of the product — the viscosity of the meat mixture. Not having that under full control will ultimately affect the finished product at the end of the process.

GEA has now designed a solution called Batch2Flow to secure the production process, save energy and water and significantly reduce the use of cleaning chemicals.

Maintaining a safe temperature of the ingredients is especially crucial in the process of making chicken nuggets. Not only does this help to prevent spoilage, it also helps to ensure that the optimum viscosity of the meat mixture is maintained throughout the initial forming process, leading to successful, perfectly created nuggets.

But that takes a lot of energy use, with specialised chilled rooms to store meat between the mixing and forming stages of the process. In addition, the process is relatively complicated and susceptible to human mistakes.

To move the mixed product from the mixer to the former, most producers use standard 200 L trollies. It's hard physical work, and inevitably, there's a time delay between the meat leaving the mixer and entering the former. At this point, it depends on the operator to ensure that no contamination enters the mix.

Industrial mixers work quickly, so before the first trolley can be loaded into the former, the next batch is filling up another trolley. So, one person has to quickly move the trolleys into a cold store while another moves them one by one from the cold store to the former. In the meantime, the optimum temperature and viscosity of the mix is starting to deteriorate as it moves towards the ambient temperature. And, if a trolley gets forgotten, it results in costly wastage as the contents will have to be disposed of. In the worst-case scenario, a forgotten trolley could be mistakenly loaded into the former, seriously risking the food safety of the product.

Even when all goes to plan there is wastage, as residue remains within the trolleys, so these have to be cleaned repeatedly with hot water and chemicals.

Automated link between mixing and forming

Batch2Flow is designed to eliminate these difficulties by moving the mix rapidly along a conveyor system from the mixers straight into the former, and the mixers have special unloading steps to allow controlled portion delivery onto the conveyor. As a result, it will be at the right temperature and viscosity when it reaches the former. No energy-consuming cold stores are needed, food waste is avoided, cleaning costs can be reduced and there is full traceability as nothing is removed from the line.

GEA noticed that the cold metal trolleys in a forming line had a tendency to attract moisture — condensation which has the potential to drip off and contaminate the mix when the trolley is tipped upside down and emptied into the former. And in tipping the trolleys upside down, the four wheels which have been on the floor are exposed above the product, time and time again. Batch2Flow is designed to remove these risks, while minimising waste and reducing energy consumption.

The solution from GEA features customised discharge gates, as well as specialised machine and line software, and allows a fully seamless process.

GEA Group
www.geagroup.com.au

Fresh food preservation methods

Increasing demand for fresher, sustainable and higher quality food puts a strong pressure on producers of highly delicate foods such as fish and seafood, meat and poultry, and fresh produce. It's not just about how good the quality of product is from moment of harvest, but rather, preserving that quality throughout every moment, from harvest, through the entire process and supply chain to finally reaching end consumers at markets or hitting the plates at homes and restaurants.

ChillPro Systems brand ChillPro FRESH is a next-generation Liquid ICE preservation technology that preserves, maintains and increases the quality of a catch or harvest. The ice technology comprises millions of micro-crystals generated from water and delivered in a Liquid ICE form to fully coat the outside of a product. Unlike flake ice and other traditional methods of preservation, the Liquid ICE technology creates full contact with the product surface, lowering temperatures instantly, preserving the 'just harvested' quality and reducing bacterial growth and spoilage. The Liquid ICE is produced, stored and pumped through sealed piping, which enables ease of use, CIP and no exposure to outside contaminants.

The ice crystals contain high latent energy, simultaneously chilling and hydrating the product. This reduces shrinkage and prevents weight loss of product, which can enhance profitability.

ChillPro FRESH Liquid ICE systems are used in applications from processing of fish to instant cooling of dairy products below 4°C such as yoghurts, creams, dips and spreads. ChillPro FRESH machines and system configurations are scalable for use onboard vessels, for land-based producers and processers, in-field or storage cooling, short-haul transport and retail outlets. Automated and easy to use, the systems are designed to save on labour costs and benefit towards carbon neutral goals.

ChillPro Systems Pty Ltd
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Improving efficiency in meat processing

Chris Little, Director, HRS Heat Exchangers

Each year Australia wastes around 7.3 million tonnes of food (equal to ~300 kg per person), which accounts for more than 5% of Australia's greenhouse gas emissions[1]. Not only does this waste have significant environmental impacts, but there are economic costs as well (the government estimates food waste costs the economy $20 billion each year). Australia has set itself a target to halve food waste by 2030, and all aspects of the food chain, from farmers through to consumers, have an important role to play in reducing the nation's food waste. The processing sector is one area where some minor changes and specifying the right equipment can lead to significant economic and environmental improvements.

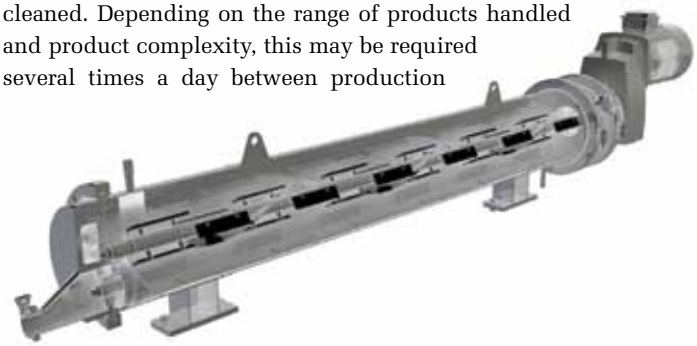
Food waste costs processors money in various ways. If a product is produced (or even partially processed) and then not sold, it has incurred costs including the cost of the raw material ingredients and the energy and labour that has gone into its production. It has also prevented the production of useful product which can be sold (an opportunity cost), and there may well be disposal and treatment costs associated with getting rid of the waste product. These costs can soon add up even at low levels, and each of these factors will have both a financial and an environmental (carbon) cost, so minimising or preventing waste has huge benefits for companies and the wider community.

One easy area to target is to minimise the losses of product which occur in equipment, and in an ideal world two different techniques will be used in combination. The first is to design food processing equipment, such as tubular heat exchangers, which prevents product adhering to surfaces in the first place — keeping it flowing through the system. The second aspect is the use of dedicated systems to clean and recover product from equipment after processing and before full cleaning occurs.

Many modern heat exchangers are designed to handle viscous materials without fouling. Some of these units use corrugated tube designs, but in the most demanding situations, scraped surface heat exchangers are used as the scrapers continually remove residues, preventing the build-up of potential waste material. These heat exchangers can be used for numerous processes, including heating and cooling, cooking, concentrating, pasteurising and sterilising.

This scraping action provides two advantages. Firstly, as the material being treated is kept moving and does not adhere to the tube surface, losses during processing are minimised. Secondly, because a 'fouling layer' is not built up, the optimal thermal performance of the heat exchanger is maintained, increasing process efficiency and reducing energy use or treatment times.

However, no matter how much you avoid product build-up during operation, equipment eventually needs to be cleaned. Depending on the range of products handled and product complexity, this may be required several times a day between production



batches. If product remaining in equipment is 'flushed' through as part of cleaning procedures, then hundreds of thousands of dollars of product can be lost each year.

Traditionally 'pigging systems' have been used to physically push product through key parts of the system, or water, air, or a cleaning solution is used to flush product, although all these systems have their disadvantages, such as their complexity or the potential to dilute or contaminate products.

Another option is to use a heat exchanger which can empty most of the product before the cleaning cycle commences. This is possible using the HRS R Series of heat exchangers. This range of tube-in-tube heat exchangers uses a scraper bar within each inner tube to enhance product flow, prevent fouling and minimise pressure drop. The unique feature of the R Series is that the scraper bar features a helical screw which rotates at high speed. When configured correctly, this screw can be run in reverse, removing product from the heat exchanger tubes without damaging it or changing its characteristics.

The system is particularly suitable for high-value viscous products such as meat and poultry emulsions, where any loses of product can be economically important. The R Series can be emptied of the majority of product without the need for any additional pumps or pressure systems. This provides advantages in terms of both capital and running costs.

Where product recovery is required, it is configured vertically, so that gravity can also be used to help recover product from the tubes. Each unit can be supplied with one, three or six tubes and multiple units can be combined for larger installations. Due to the amount of product saved, and the fact that it is often unnecessary to install additional product recovery systems, the heat exchanger can quickly pay for itself, and in the long term can be a more economic option than alternative systems which have lower capital costs.

The unique design of the R Series also provides several other benefits, such as improved mixing (and therefore improved homogeneity and more effective heat transfer) within the product. As such they are particularly useful for high-fouling products such as meat paste and meat slurry. However, because of the increased resistance within the tube, scraped surface heat exchangers (SSHEs) can create much higher pressure drops than open tube heat exchangers. A higher pressure drop means more pressure (and therefore more energy) is required to operate the equipment.

The HRS R Series of SSHEs is designed to reduce this pressure drop, using a helical screw, which resembles an auger wrapped around the scraper bar. The key to this design is the gap between the edge of the helix and the tube surface, which provides three important benefits. Firstly, the pressure drop is reduced along the heat exchanger, particularly for difficult high-viscosity products. Not only does this reduce energy consumption, but it also helps to maintain product identity and quality. The second benefit is that the gap increases turbulence at the tube wall, helping to reduce fouling and improve mixing.

The multi-tube versions of the R Series use a single motor and gearbox, helping to reduce running and installation costs, reduce operating complexity and reduce the overall footprint. Furthermore, thanks to a unique sealing system, individual tubes can be removed for cleaning or inspection, meaning that servicing is quick and parts do not need to be sent away for rechroming. Key low-cost spares can be held onsite and replaced quickly and easily. A unique gearbox design reduces operation noise, making it suitable for working environments such as food factories, while standard features include a hygienic stainless-steel construction, and units can be fully insulated and cladded.

1 https://www.environment.gov.au/protection/waste-resource-recovery/food-waste

HRS Heat Exchangers Australia New Zealand
www.hrs-heatexchangers.com/au/

Data management platform

InformationLeader is a web-based data capture, management and reporting software platform. Created as a replacement for paper-based processes, the system is used by organisations to capture, analyse and manage information in a secure digital environment.

The platform is suitable for highly regulated industries to consolidate disparate data into a single digital system — all while maintaining full auditability and compliance with national and international regulatory requirements. Powerful traceability features such as change history and fully versioned records make the platform well suited for the food industry; example applications include companies in meat processing and export, dairy, poultry, fresh produce, baked goods, ready-to-eat meals, grain production and seafood.

The paperless system is designed to provide instant access to critical information at the click of a button, measured against key performance indicators that have been defined. Features include smart, fully customisable electronic templates with traceable workflow; reporting and dashboarding capabilities and intelligent automation practices to ensure key stakeholders are kept informed.

Each implementation is tailored to the specific workflows and processes of the organisation and can be evolved to suit business needs and growth. Past implementations have focused on quality assurance and compliance, health and safety, environmental management, administration and training, and hazard analysis and threat assessment.

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Vertical form fill and seal packaging system

tna solutions has launched the latest iteration of its flagship vertical form fill and seal (VFFS) packaging system: the robag 3e.

Featuring a new CXE integrated display controller, smart diagnostic tools and intuitive time-saving components, the system is capable of delivering up to 250 bags per minute (bpm) with wastage as low as 0.1%, alongside enhanced serviceability.

The simplicity of the VFFS packaging solution makes it easy to operate, service and maintain. Featuring EtherCAT real-time protocol and an integrated display controller system, the system is designed to reduce cabling infrastructure by 20%, enabling easier servicing and lower total installed costs. The system shares common core components with tna roflo distribution conveyors and the tna intelli-flav seasoning system reducing the need for additional spare-parts stocking, and features integrated LED lighting in the packaging jaw area to make maintenance safer and easier to perform. Equipped with smart diagnostics and remote connectivity, the system also offers real-time communication and status updates, enabling faster global servicing support.

Featuring stainless-steel reinforced doors and tunnel guards, along with an integrated film cutting and dispensing component, the solution is designed to deliver maximum efficiency and enhanced energy savings.

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Decarbonisation in food processing

Heat pumps and thermal energy storage lead the charge to net zero.

When one of Australia's largest fruit growers, WF Montague, was designing its greenfield apple and stone fruit packing facility in Narre Warren, Victoria, energy efficiency was central to ensuring a state-of-the-art facility that delivered efficiency, sustainability and competitiveness.

As is often the case in food and beverage production, however, the company faced a challenge. The heat demands for cleaning and waxing fruit prior to cold-storage far exceeded the small amount of waste heat available from the Ammonia refrigeration system used for its controlled-atmosphere cold rooms. Burning gas in boilers was the typical solution used by Compac — the processing equipment supplier, but the cost of a gas connection and the negative impact on Montague's decarbonisation plans meant this solution was not feasible. The decarbonisation of heat requiring a transition from gas to electricity is a significant challenge when high-temperature hot water is required and there are few solutions.

The perfect match: heat pumps and thermal energy storage

The design engineers for the project's refrigeration systems, Liquid Ice Refrigeration, worked with Compac and Australian heat pump manufacturer Glaciem Cooling Technologies to design and deliver a high-temperature heat pump system that provides the large amount of hot water required. The system provides the hot water with a very high efficiency, the by-product of heating the water is free cooling for the main ammonia/glycol cooling system. As a result, when the heat pump is heating water the ammonia refrigeration plant is not required. This reduces the power required for refrigeration and reduces the operating cost and extends the life of the ammonia compressor.

Often process needs result in a mismatch between heating and the cooling demands. Typically this happens in winter when the cooling loads are low. Most heat pump systems would cool the ambient air during this time which is non useful cooling. Glaciem's unique design incorporates Thermal Energy Storage (TES) as a cooling source instead of air. TES is a system that uses a phase change material to store energy. When the heat is extracted from the liquid in a TES System, the contents of the system change from liquid to solid. Essentially this is storing "cold". It is like a 'thermal battery' charged with cold thermal energy — rather than electricity — when the heat pump extracts the heat from it. The cold stored in this process is very dense and can be discharged at another time as you would use the power in an electrical battery, but with better efficiency. A TES system also has a life of about 30 years and can be charged and discharged without the degradation effect common with electrical batteries. This provides a way for the cooling to be used at a different time to offset the refrigeration demands of Montague's refrigeration systems.

Glaciem heat pumps use CO_2 in a "refrigeration cycle" to move heat out of a heat source and deliver it in a form that is

useful for applications at higher temperatures. Heat pumps improve the quality of the heat using mechanical energy — a set of compressors which produce about three times the thermal energy for each unit of electrical energy utilized. The result is the production of significant volumes of hot water at 83°C. This replaces the need to burn gas, drastically reducing CO_2 emissions. The Glaciem CO_2 heat pump operates with high efficiency even in the coldest of Narre Warren days, unlike many heat pump designs which would not work efficiently in cold ambient conditions including Ammonia heat pumps.

The operation of the system is controlled by Glaciem's forecasting, optimization and control system which ensures the TES is charged and discharged for optimal energy use. For other Glaciem TES users the system allows them to optimize behind-the-meter solar PV generation or Power Purchase Agreements (PPAs) to maximise the use of renewables and to shift load to take advantage of variable energy costs (price arbitrage). It enables heat pumps to concurrently cool and heat when their demand for cooling happens at a different time to their demand for heating.

Overall, the result of this approach is a reduced energy cost and a reduced carbon footprint. As the sector looks to meet ever increasing carbon reduction targets, CO_2 heat pumps integrated with thermal energy storage are a critical part of the hybrid energy systems designed for the heating and cooling needs of most food and beverage production processes.

Bespoke system design for optimal efficiency

As with Montague's and all of Glaciem's projects, the CO_2 heat pumps are customized to suit the exact mix of heating and cooling demands of the application for the best efficiency. These designs not only ensure optimal efficiency at "design load" (the peak energy required), but also "part loads". Part loads are common in most applications for most of the year. Part loads occur when the ambient conditions are not as extreme as the peak conditions designed for or when production loads are lower. This means a large amount of thermal energy produced by a small amount of electricity — providing much better performance than electrical boilers and traditional HFC chillers.

The system is built with premium components and is delivered as a complete, tailored package to the same refrigeration and mechanical services contractors who provide other systems on site. In the case of Montague, refrigeration contractor Oomiak installed, commissioned, and integrated the system with the Ammonia refrigeration plant on-site, specific to Glaciem's designs.

Size and scale are also challenges for off-the-shelf heat pumps which tend to provide a lower temperature water, adding complexity and cost to many industrial and commercial applications. The heating demands at Montague's Narre Warren site are met with a heat pump capable of producing high-temperature water and 1100 kW of heating, from a single CO_2 heat pump, believed to be the largest CO_2 heat pump in the Southern Hemisphere. The system is controlled by a Schneider PLC with a state-of-the-art human-machine interface (HMI). The HMI allows site operators and contractors to view the current operations of the system, the state of charge of the TES system, the internal operations of the heat pump including compressor status, energy use, energy flows, temperatures and pressures. People unfamiliar with the physical layout of the system can see a visualization of the actual system layout with the major components and their status described with overlays. Conditions needing attention are highlighted in red. Further, the heat pump's Internet of Things (IoT) design means all of this can be viewed remotely, allowing Glaciem engineers in Adelaide to monitor and manage the system and support the onsite activities of service and maintenance engineers.

System specifications:

Heat Pump Specification	Glaciem GHP-6626 CO2 high temperature heat pump
Design Demand Load Heating	716kW @50°C - 83°C I 1100kW @35°C - 83°C
Design Demand Load Cooling	726kW @ -4°C
Refrigerant:	R744 (CO2)
COP (Heating and Cooling)	3.8
Dimensions	6500Lx2400Wx2387H mm

Thermal Energy Storage System	2 x Glaciem DYN900 TES Systems
Storage Capacity	4000kWh
Phase Change Material	-6°C PCM
Charge Rate	200kW@10 hr
Discharge Rate	200kW@10 hr
COP (Discharge)	40-70 depending on the discharge profile
Dimensions	6418Lx2772Wx3330H mm

A path to decarbonisation

The project has resulted in Glaciem providing Montague with a way to deliver its hot water demands with optimal energy efficiency, and to eliminate the need to burn gas (or other fossil fuels). Montague is set up to meet its decarbonisation objectives without the need to tackle the complex transition from gas to electricity in the future.

This Project received funding from ARENA as part of ARENA's Advancing Renewables Program.

GLACIEM COOLING TECHNOLOGIES

Glaciem Cooling Technologies
glaciemcooling.com

Reducing salt in bread:
research provides four options

Salt is an essential ingredient in bread-making; it contributes to the structure and flavour of the bread, and is necessary for the yeast to work properly. Now a new study from the University of Illinois explores ways to reduce sodium in bread without sacrificing taste and leavening ability.

Sodium overconsumption has been a cause for concern in recent years. While we can't completely eliminate salt from our diet as it is an essential nutrient, food manufacturers can help consumers reduce their consumption to a healthier level by reducing the salt in processed products, such as bread.

"About 70% of sodium in the US food supply comes from packaged and processed foods. And the top source is actually baked goods, so reducing salt in that particular category would help to reduce sodium consumption tremendously," said study co-author Soo-Yeun Lee, professor of food science at U of I.

The researchers conducted an extensive review of academic literature on sodium reduction in bread. They identified four main categories:

1. Salt reduction without any further mitigation
2. Physical modification
3. Sodium replacements
4. Flavour enhancers

"The most basic method is just reducing the amount of salt in the product," said Aubrey Dunteman, graduate student in the Department of Food Science and Human Nutrition at U of I, and lead author on the paper. "That can be good to a point, depending on the original level of salt and equivalent in the recipe. There's always going to be a minimum amount of salt you need just to have the bread function and the yeast do its job. So it's a limited method, but it can help to reduce high levels of sodium intake."

Another method is physical modification, which involves uneven distribution of salt in the product.

"Sensory adaptation occurs when you have constant stimulus. If the salt is evenly distributed in a slice of bread, as you take more bites, it's going to taste less salty, because you're already adapted to the first few bites. But if you have different distribution of salt, alternating between densely and lightly salted layers, people will perceive it as more salty. So you can obtain the same taste effect with less salt," Lee explains.

A third method involves replacement of sodium with other substances, such as magnesium chloride, calcium chloride, or potassium chloride. "This is one of the most commonly used methods in industry, but it can only be used up to a certain point, before you get a bit of a metallic taste from these compounds," Dunteman points out.

The fourth method involves flavour modification with taste enhancers such as herbs and spices, or even monosodium glutamate (MSG). The researchers note multi-grain bread also allows for more salt reduction than white bread, because it has more flavour on its own.

Dunteman and Lee concluded that the best approach to sodium reduction in bread will be a combination of methods.

"One of the four categories, salt reduction, is technically involved in all of them," Dunteman notes. "Another category, salt replacement, is already heavily studied. We recommend more research into physical modification methods, as well as flavour enhancement types, and how to combine each of these methods with salt reduction."

The four methods are detailed in the researchers' paper, published in the *International Journal of Food Science and Technology*.

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Mounted on a mobile frame with locking castors and a fold-down step, the Bag Dump Station is secured to the floor hopper with quick-release clamps, and features a gasketed bag disposal chute through the side wall of the hopper hood, allowing the operator to pass empty bags directly into the bag compactor.

Dust generated from both dumping and compaction is drawn onto the system's two cartridge filters. An automatic reverse-pulse filter cleaning system releases short blasts of compressed air inside the filters at timed intervals. This causes any dust built up on the outer surfaces to fall into the hopper, conserving useable product. Filters are readily accessed by removing the interior baffle, and replaced using quick-disconnect fittings.

The compactor employs a pneumatic air cylinder to compress 50 to 80 empty bags into a removable bin lined with a plastic waste bag for dust-free tie-off and disposal. The main door, and a flapper door within the bag infeed chute, are equipped with safety interlocks that prevent operation of the compactor unless both doors are closed.

The hopper discharges into an enclosed, 4.6 m flexible screw conveyor that handles a broad range of materials including free- and non-free-flowing bulk solids ranging from large pellets to sub-micron powders, including products that pack, cake, seize, smear, fluidise, or crumble, with no separation of blended products. The flexible screw is the only moving part contacting material, and is driven by an electric motor beyond the point at which material is discharged, preventing material contact with seals.

The Bag Dump Station, support boom and conveyor assembly can be tilted down to manoeuvre through standard doorways and aisles, and around corners for use anywhere in the plant.

The entire unit can be rolled to a cleaning station where a lower clean-out cap on the conveyor tube can be removed to flush the smooth interior surfaces with steam, water or cleaning solutions, or to fully remove the flexible screw for cleaning and inspection.

The system is available in carbon steel with durable industrial coating, with stainless steel material contact surfaces, or in all-stainless steel finished to industrial, food, dairy or pharmaceutical standards.

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Air filtration audits for food processing facilities

Camfil Australia's site service team can provide food processing or pharmaceutical facilities with obligation-free air filtration audits to help users meet relevant industry standards and identify potential operational cost savings.

The audit includes documenting the condition of existing plant room and internal HEPA location structures, external fabric, fixtures, fittings and mechanical services.

Camfil assess the useful lifetime of HVAC equipment, identifying filtration requirements and recommending appropriate equipment improvements, HVAC filter change schedules and, where appropriate, HEPA filter change and NATA validation service schedules.

To identify potential long-term cost savings, the company can conduct total cost of ownership (TCO) assessments internally for each site using its patented Camfil LCC software to compare various filters and predict long-term costs.

Considerable long-term cost savings for food processing sites are often identified through the upgrade of standard HVAC filters to premium, high-performance HVAC filters requiring less frequent replacement and lower resistance operation, which can result in reduced fan horsepower and energy consumption.

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Fake meat from by-product of soy milk production

A team of researchers from Kaunas University of Technology (KTU), Lithuania and the University of Helsinki have developed a meat analogue using fermented okara (soy press cake). The product is said to be nutritious with less salt and saturated fats and more flavour than real meat.

Although fermented foods are rich in nutrients and fermentation can produce ingredients that improve smell and taste, the researchers from KTU Food Institute were among the few who relied on this process in meat analogue production.

"Both business and science will have to reconsider the effect of using secondary raw materials, and it will benefit all the parties by reducing costs and saving resources," said one of the authors of the study, Dr Alvija Šalaševičienė, the Director of KTU Food Institute.

Okara is the by-product that remains after pureed soybeans are filtered in the production of soy milk and tofu.

The researchers produced meat analogues by adding fermented okara to the plant-based matrices. Okara samples were fermented by applying probiotics *L. plantarum* P1 and *L. acidophilus* 308 strains. The products containing different amounts of fermented okara modelled under different conditions were then evaluated by the researchers.

The study concluded that the use of fermentation makes okara a suitable component for meat analogues. According to the sensory and nutritional analysis, the optimum condition for producing meat analogues was the application of 6% okara in the matrices fermented by *L. plantarum* P1, when the matrices and okara are maturated at 4 °C for 2 hours.

According to researchers, the meat analogues with fermented okara have more free amino acids, which make them more easily digested than meat. They also contain less fat and saturated fat but the same amount of protein as real meat — about 14-18% depending on different recipe variations.

"Non-hydrogenated oils containing only small amounts of saturated fat were used while developing our products. Thanks to the small amount of fat we were able to create characteristic flavours by using only 1% of salt. Among the 11 ingredients used in our product, [there] are only natural spices, pigments and aromatic compounds, and no preservatives," said Dr Gitana Alenčikienė, senior researcher at KTU Food Institute and co-author of the study.

Currently, there are no commercialised meat analogue products with okara. However, the researchers are convinced their modelled meat analogue will find its way to the market.

Meat analogue with fermented okara is one of many products created by the researchers of KTU Food Institute. Recently, its pea-based meat analogue won the local innovation fair.

"Both meat analogues are nutritionally valuable: our product with fermented okara is more easily digested and the pea-based meat analogue is enriched with iron, which is very important for the normal functioning of the human organism. While creating our products we aim to solve at least one nutritional problem — be it calorie control, lack of fibre or iron, or sluggish digestion process," explains Aelita Zabulione, a researcher at the KTU Food Institute.

The study by Kaunas University of Technology and University of Helsinki researchers is called "Impact of fermentation of okara on physicochemical, techno-functional, and sensory properties of meat analogues".

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Creating a world of opportunity

Skills management and development

re-invented for the plant floor

If you're like most organisations today, you probably can't recruit and train new hires quickly enough to replace the outflow of workers retiring or leaving your organisation each year. Some of your workers have likely been with your organisation for decades. When they leave, they take all of their experience and tribal knowledge out the door with them, making them impossible to replace overnight.

Training is now the top investment priority for 74% of manufacturers surveyed in Deloitte's 3rd annual Industry 4.0 Report. This represents a significant shift in thinking as only 12% listed this as a priority two years ago. These organisations recognise that they need to continuously develop workforce skills in order to succeed in a constantly evolving Industry 4.0 environment. So, it's no surprise that 80% of surveyed CXOs said they have created or are in the process of creating a culture of lifelong learning, and another 17% said they have plans to do so in the near future.

To enable more effective lifelong learning, organisations must use new skills development and management strategies to address the many problems with traditional training methods. These include:

- Training is typically a one-time event. If workers don't grasp everything they need to learn in that short period of time, there's no easy way to do so later.
- Workers don't have visibility into their skills or what's expected of them after their initial onboarding, and updates to standard procedures are often communicated verbally.
- Worker skills are still being manually tracked in Excel spreadsheets, making it more difficult and time-consuming for management to verify, update and prove compliance.
- There is no systematic way to capture and share workers' knowledge and experience, so they can't easily learn from one another.

The good news is that with applications like AVEVA Teamwork, a more efficient and effective way to train workers and manage their skills now exists, and it's generating impressive results at some of the world's leading organisations.

From one-time training events to continuous, on-the-job learning

We've all heard the research or know from personal experience that people only retain a fraction of the information they are presented with during training if they don't immediately practise or apply what they learn.

In fact, only 62% of people transfer information immediately after training, according to a Saks and Belcourt research study, and that number drops to 44% after six months.

Because most training is squeezed into a one-time training event with a specific start and end date, there is a tendency to overload workers with too much information. Our brains were simply not designed to process and retain so much information in such a short period of time.

And even when new hires have the opportunity to apply what they learn during on-the-floor shadowing, the less frequent tasks that are only done weekly, monthly or annually are forgotten by the time the need arises.

That's why some organisations are moving away from one-time training events in favour of continuous skills development using a digital performance support application. Workers learn how to perform a task or work to a standard directly at their workstations by viewing digital content and micro-lessons on a tablet. They use the tablet to scan a QR code on their machine to instantly access all the skills required to operate the equipment and troubleshoot problems.

A step-by-step training program for each skill outlines all the digital content that must be viewed and any exams and


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mandatory offline activities that must be completed, such as shadowing and classroom training.

Workers use the app to access training manuals, work instructions, SOPs, exams and even link to any content that is stored in external systems. After completing all steps, workers can take an online exam and request an endorsement from their supervisor, who then observes them performing the task and ranks their competency level.

Because the content is digital and always available, workers don't need to learn everything at once. They can start a lesson whenever they have a few minutes to spare and as the need arises. The app tracks where workers are in a lesson and makes it easy for them to resume their training.

By empowering workers to learn at their own pace at their workstation, a large food company can reduce shadowing time and manpower-related costs by 40%.

By making digital content easily accessible at their stations, workers at a leading confectionery manufacturer are now accessing critical information needed to do their jobs 90% faster compared to when the information was stored in binders away from their stations.

Many organisations are also gradually replacing their text-based content with video micro-lessons in order to accelerate comprehension and retention.

"Video micro-lessons are quicker and easier to understand than reading text. Text can be easily misinterpreted, whereas there is no ambiguity with videos," explained the Operations Support Coordinator at a Canadian producer of premium dairy products.

Engaging workers in their skills development

Workers lack visibility into the skills they need to develop and update in the short-term, and how they can prepare themselves for future roles and responsibilities. With the app, workers view their individualised curriculum, are notified when a work instruction has been updated and track their progress directly at their workstations without having to rely on their supervisor or training department to pass on the information.

They simply navigate to their profile page to get an at-a-glance view of all the skills, work instructions, troubleshoots and compliance training that have been assigned to them based on their job title and location.

From manual skills tracking to automated skills management

Learning and development stakeholders are increasingly assuming a more strategic role within their organisation to ensure their workforce has the needed skills to support operations both today and in the future. To do that, they need to have real-time visibility into the current skill set of workers, and be able to identify where the gaps are now and will be in the future. However, manually tracking and updating worker skills is time-consuming and the cause of outdated, unreliable and non-compliant records. The app presents a digital skills matrix that gives management real-time visibility into workforce competencies.

It makes it easy to quickly see skills coverage across team members, including who has requested endorsements and which skills are due for renewal. The matrix is automatically updated and provides easy access to the content and exams used to train workers.

From tribal knowledge to collective knowledge

96% of workplace learning is informal and only 4% is formal, according to a study from the 70:20:10 Institute. Without a more efficient and effective way for workers to pass on their knowledge and ideas, tribal knowledge persists and is lost forever when workers retire or leave.

That's why organisations are empowering their workers to digitally communicate, collaborate and share information with one another directly at their workstations. With the app, workers post calls for help with photos or video as issues arise. Experts across the company can comment and collaborate to offer suggestions and find a solution. Once a problem is solved, it can be automatically converted into a troubleshooting solution in the knowledge base for others to learn from.

The key is to engage workers in their skills development, and this can be done by:

- empowering workers to be autonomous and learn more efficiently and effectively
- empowering management to be more strategic and make timely decisions
- empowering everyone to share knowledge and contribute to continuous improvement.

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'Meating'
expectations for plant-based proteins

Researchers from the University of Queensland are teaming up with US-based Motif FoodWorks to design plant-based proteins that are tastier and more nutritious.

As part of a three-year Australian Research Council project, the university's engineers and food scientists will work with the US-based food technology company to design and develop plant-based proteins that meet the taste and texture desired by consumers.

There are plenty of people who like eating meat but are also increasingly interested in plant-based meat alternatives for environmental or sustainability reasons. These consumers want the plant-based protein to have the same characteristics as a normal meat experience.

Professor Jason Stokes from UQ's School of Chemical Engineering said attributes like taste, texture and smell combined are primary drivers for consumers when considering a meat-free option.

Associate Professor Heather Smyth and Professor Jason Stokes in QAAFI's sensory lab, where food testing is carried out.

"It's not just the taste, it has to be the texture as well, so the team wanted to understand the mechanics that occur during eating and simulate them in a laboratory," Professor Stokes said.

Queensland Alliance for Agriculture and Food Innovation's (QAAFI) Associate Professor Heather Smyth said innovations around texture mechanics were the key to creating the best plant-based eating experience.

Dr Smyth will research different ways of pre-treating plant protein in a way that makes it behave more meat-like in the first place, rather than just compensating burger formulations with various synthetic additives.

"This might include fermenting them, extracting them differently or structurally modifying the plant-protein," she said.

"Making the plant protein behave differently as an ingredient is really the space where we can have those breakthroughs, and already we're seeing some interesting results."

Getting plant-based proteins to have similar qualities to those of meat is an important step in making them attractive, as consumers have specific properties in mind that they want to experience when they bite into a burger or cut into a steak.

"Through this work with the UQ team we're bringing together the physics and sensory aspects of eating," said Dr Stefan Baier, Head of Food Science at Motif FoodWorks.

"This project will unlock the secrets of food to help us design plant-based options that live up to the taste and texture expectations of consumers."

Professor Stokes said: "We really have been leading this area of research for some time and that's why companies like Motif and others have come to us in Australia, even though we're a long way away from where they do their work.

"The landscape's changed and people now recognise the challenges in food research, and they're large challenges in terms of how we perceive food and how we understand food, and rationally design and engineer their microstructure."

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With flow rates from 0.08 L/min @ 3 bar, the RW Hollow Cone Hydraulic Atomiser Nozzle Tips from PNR are designed to provide a finely atomised hollow cone spray at very low pressure for fast evaporation.

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The nozzle tips are available in brass and AISI 303 or 316L stainless steel. As a result, they are robust and resistant to chemical damage. This also makes them suitable for applications such as dust or odour control, humidification and spraying liquid deodorant or disinfectant.

To attach the atomising tips to a spray bar, simply weld the appropriate welding nipple into place and secure with a locking cap. This eliminates the risk of damaging the thread when removing the tips for cleaning.

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Mini embedded mezzanine board

Metromatics presents Alta Data Technologies' mini embedded mezzanine board, the MEZ-E1553, which has been designed to be suitable for networks operating within the MIL-STD-1553 standard. It provides 1–2 dual-redundant 1553A/B/C channels, has an Ethernet backplane interface, uses a 3.6 x 5.6 cm PCB and comes in dual (BC/BM or mRT/BM) or full function (BC mRT/BM) models.

The product can be integrated into hardware using most operating systems as it uses the Berkeley socket layer. A design reference card is offered, as are its complete schematics. STEP 3D files and break-out cables for bench testing are also provided. Signal capture capability, 1553 cable issues and cybersecurity are included as well.

The product is an FPGA hardware-based UDP thin server that can provide a real-time 1553-Ethernet connection, reducing malicious agents such as hackers or viruses. It features a fast auto-boot system and data structures are controllable through standard socket communications.

Metromatics Pty Ltd

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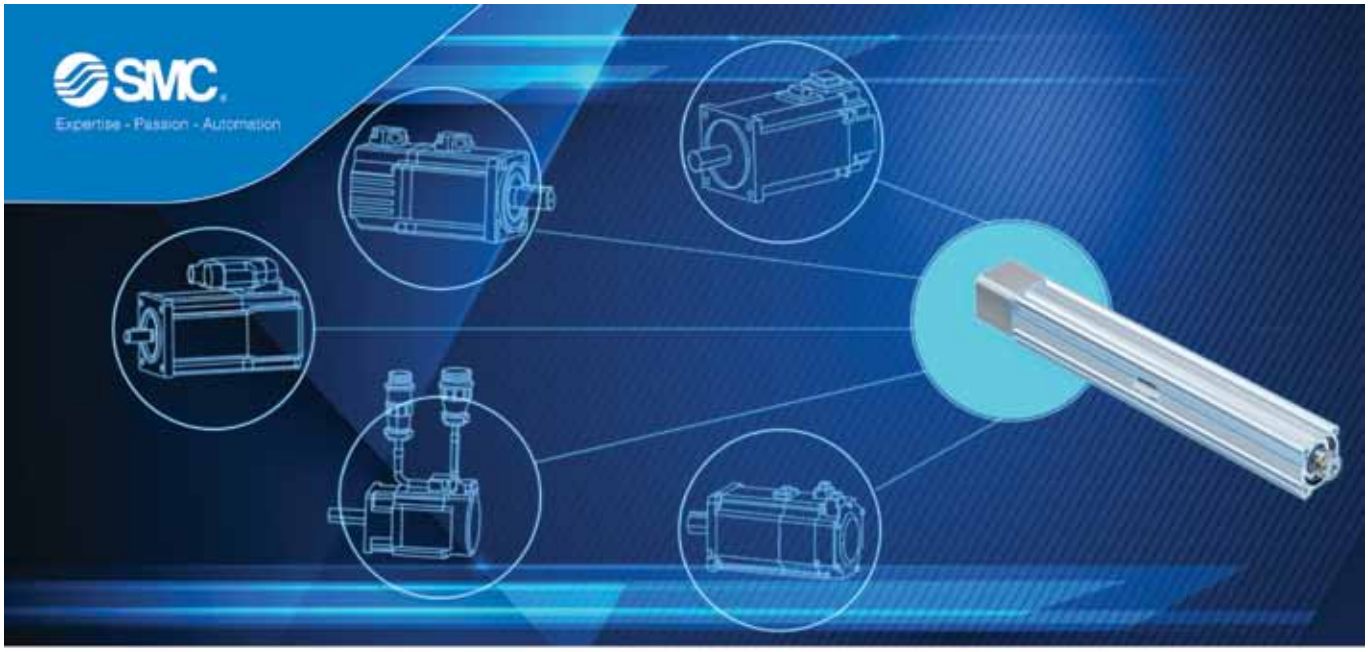
Pulsing with life:

Australian Government boosts research into plant-based protein

Australia produces a 20th of the world's pulses but is unable to significantly contribute to the increasingly important plant-based protein market. The typical pulses that Australia grows — chickpeas, faba beans, mung beans, lupin, field peas and lentils — are not regularly used for protein additives in meat-alternatives. Instead, soy bean and yellow pea are the favoured crops of this market — crops that are not widely viable for growing in Australia.

New research is aiming to change that, however, with the Transitioning Australian Pulses into Protein-based Food Industries project having received almost $1 million in funding. This project aims to boost the commercial applications of the pulses that Australia grows.

Researchers from the University of Sydney are hoping to find ways of efficiently processing these pulses, keeping water and energy consumption low, into useable protein concentrates and



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isolates. If this can be achieved and commercialised, it could lead to Australia being a solid source of protein for meat-alternatives in future years.

"At the end of this three-year project, we envisage Australia's plant protein food and ingredient sector will be sufficiently established to encourage local investment in protein fractionation plants, which produce proteins from pulses, across Australia," said lead researcher Professor Brent Kaiser.

"Australia produces about 4% of the world's pulses, putting it in plum position to be a key player in the growing plant protein market. Working with domestic and international partners with expertise in pulse seed processing and food manufacturing, we will fill a critical gap in the local plant protein food supply chain."

Researchers will be working with industry partners AEGIC, Roquette, Clextral, All G Foods and Wide Open Agriculture.

Dimpled cross-section heat exchanger

Teralba Dimpleflo dimpled cross-section heat exchanger is designed to break up laminar flow.

The R&D team at Teralba Industries never rest when it comes to its Dimpleflo tubular heat exchanger.

Constantly striving to increase heat transfer coefficients, they use different configurations of dimples at various depths to produce the optimum heat exchanger for viscous and fouling products.

Using dimples to disturb laminar flow behaviours, these turbulence enhancing deformations generate eddies and vortices that have an added benefit of minimising fouling — particularly in UHT and high-temperature processing applications where fouling and burn-on can be an issue in conventional double tube heat exchangers.

As pictured, the Dimpleflo tubing causes turbulence in a thick stick jam-based product.

Dimpleflo Heat Exchangers have been successfully installed in applications as diverse as processing human blood to heating sewerage sludge in anaerobic digesters.

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CASE STUDY

Twice the speed and improved quality for tortilla producer

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A Greek tortilla producer has doubled its speed of production and packaging, while increasing the quality of its product, with the introduction of an automated production line using robotic and variable frequency drive (VFD) technology.

A new conveyor process was introduced to the tortilla producer's existing manufacturing facility in Athens, Greece. Tortillas carried along the line are checked for quality before being packaged and palletised for distribution.

Automation Experts, a sales partner of Invertek Drives, was appointed by Robotsys, a specialist robotics and automation company, to develop the system using Optidrive VFDs. The process also involved the control of a robot for the packaging and palletising of the products at the end of the line.

The Optidrive E3 was chosen for the line and piston control, while an Optidrive P2 was selected for the movement of the picking and packaging robot. The Optidrive E3 is available in IP20 and IP66 enclosures and four frame sizes, making it suitable for a wide range of applications and environments.

The Optidrive P2 high-powered drive is meanwhile available in IP20, IP55 and IP66/NEMA 4X enclosures, with single- and three-phase input between 200 and 600 V, 0.75 and 250 kW and 1 to 350 HP. It supports all motor types, including IM, PM, BLDC and SynRM.

The Optidrive E3 has three application modes out of the box — industrial, pump and fan modes — which makes it easy to set up and commission for a range of applications. The set-up, commissioning and changing of parameters can also be easily undertaken on multiple drives through Bluetooth and NFC

The new production line used Optidrive E3 variable frequency drives.

connectivity. Connected to Invertek's Optitools mobile app via the Optistick Smart means replication of parameters to other drives is effortless where multiple drives are being set up.

Teo Amiridis of Automation Experts said: "The project involved designing a completely new conveyor solution, including more automation than the existing process. The customer wanted to increase the speed of the line, including the quality control element, before packaging the tortillas automatically.

"The six-conveyer line uses a total of 12 Optidrive VFDs. Six Optidrive E3s control the motion of each conveyor, with a Cartesian system controlled by two E3s to find the correct angle for rotating the conveyor. Three more E3 drives control the 'rejection pistons' which are used to push scrap products off the line.

"The conveyors must sync with the rejection pistons to allow the right batch of tortillas to be pushed off the line at the correct time. So, accurate motion control is crucial for each element of the line.

"At the end of the line, the product is then packaged and palletised using a Yaskawa robot. The position of the robot is controlled with an Optidrive P2. Working with Robotsys, we were able to design a completely automated system."

The customer reported the new line working twice as fast as existing lines, along with a superior quality product as a result.

"The quality and control were an objective from the outset," Amiridis said. "We're pleased that we've doubled the speed of production while at the same time improving the quality of the product."

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Finding a better way to clean tannin manufacturing equipment

A tannin manufacturer was looking for a way to efficiently clean their equipment. Discover how they overcame this challenge.

While tannins occur naturally in wine, they can also be added to stabilise it and prevent formation of bacteria and moulds. That's why tannin manufacturers need to follow strict cleaning protocols.

One tannin producer was looking for a washing process for their machinery. Before seeking help, they were manually cleaning the equipment (which included a large net basket) using high pressure washers. As a result, the cleaning process required large amounts of water and a great deal of manual labour.

Confident there was a better and more cost-effective way to clean their equipment, the tannin manufacturer sought expert assistance. With help from the Technical Department of PNR Italia a solution was found in the form of a skilfully designed washing system.

How it works

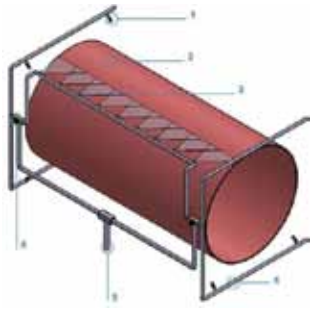
A series of manifolds are now located along the longitudinal axis of the net baskets used in the tannin manufacturing process. On the upper side of the manifold and positioned around the basket are nine high impact Flat Fan Nozzles. With a spoon-shaped convex surface, their role is to produce a narrow-angle, high-impact jet of cleaning fluid.

In addition, eight Rotating Washing Heads were installed in C-brackets to support the manifold structure. These Washing Heads are located at the top and bottom of the basket at both ends. Made entirely from stainless steel, the Rotating Washing Heads are mounted on a double row of steel ball-bearings to facilitate use in any position. Their role is to clean residue removed from the Flat Fan Nozzles to ensure the inside of the box is thoroughly cleaned.

A liquid supply inlet is positioned in the centre of the main manifold to pump cleaning fluids throughout the system. Three-way ball valves have also been installed to manage the flow of cleaning liquid so it flows first to the Flat Fan Nozzles and then onto the Rotating Washing Heads.

As a result of this clever design solution, the tannin manufacturer has significantly reduced the amount of water required to clean its equipment and decreased its labour costs.

Recognised for their ability to provide outstanding technical solutions, Tecpro Australia and their partners have been called upon to streamline cleaning operations across a wide range of industries. In addition, Tecpro is the exclusive distributor for many high-quality, European brands including the entire range of PNR Italia's spray nozzles.



If you have a production or operational issue that you would like to streamline, speak to the team at Tecpro by calling 02 9634 3370 or email sales@tecpro.com.au.

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Oranges and lemons:
food-grade wax safety study

Food-grade waxes are applied to a number of produce items before storage and distribution to control post-harvest decay and extend shelf life. While commodities such as apples and oranges receive a single waxing, lemons receive both storage and finishing wax treatments. But little is known about how different waxes and the waxing step impact microbial food safety. Luxin Wang, PhD, an associate professor with the University of California, Davis, wanted to address those knowledge gaps through her research project titled: 'Waxing of whole produce and its involvement in and impact on microbial food safety'. Wang's co-principal investigators are UC Davis colleagues Linda Harris, PhD, and Lena Sheng, PhD.

"We hope to provide the industry with information about how waxes contribute to the microbial safety of fresh produce by using lemons and oranges as model products," she said. In addition, Wang said, the results could be used by individual packinghouses to support the development of their food safety plans or risk assessments.

The project has three objectives, two of which will be conducted in the laboratory, while the final objective will begin in the lab and be completed with validation in the pilot packing plant. Two five-strain microbial cocktails composed of *Listeria monocytogenes* and *Salmonella* spp. will be used for this study. The cultures are from co-PI Harris's culture collection, and they are isolates from previous produce outbreaks.

For objective one, four storage waxes and 15 finishing waxes were obtained from industry collaborators. The researchers evaluated the chemical and microbial characteristics of these waxes as well as their impact on pathogen survival.

"The waxes had a wide range of pH from 8–13 and varying compositions," Wang said. "Among them, two storage waxes and one finishing wax had background populations of microorganisms."

> *We hope to provide the industry with information about how waxes contribute to the microbial safety of fresh produce by using lemons and oranges as model products.*

The team observed that the behaviour of pathogens inoculated into the waxes depended on the pathogen type, the type of wax and the storage temperature.

"In general, *Listeria* survived better than *Salmonella*, and both pathogens survived better at 4°C than 22°C and in diluted waxes than in undiluted waxes," she said. "Since storage waxes are used in diluted form, information obtained from objective one will help the industry decide how to better store their unused or used storage and finishing waxes."

For the second objective, storage waxes will be applied to lemons inoculated with pathogens and then stored at 4°C or 22°C for specific periods of time mimicking storage conditions at lemon packinghouses.

"For the first two objectives, we would like to mimic two scenarios. The first is to evaluate what happens if the fruit is exposed to contaminated waxes," Wang said. "In the second scenario, the fruit arrives at the packinghouse already contaminated on the surface before the wax is applied."

The team is now just beginning objective two. In the final portion of their research, which has not yet begun, the researchers plan to evaluate pathogen control efficacy of finishing waxes and the heated drying steps in pilot packinghouse trials. A nonpathogenic surrogate organism will be used for this study.

Commercial crate and bucket tunnel washing machines

MatMan's TECO is a crate washing machine that washes trays, crates, baskets, pails and buckets to a maximum size of 490 wide x 260 high.

The tunnel washer's simple design means crates can be automatically or manually loaded into the product at one end and come out clean from the other. The product is suitable for single-person operation and is able to wash up to 300 containers per hour (soiling dependent) via a frequency controlled VSD transport belt.

The standard machine is set up with a 300 L main tank with electric heating elements. Steam injection and heat exchangers are optional. The water is recaptured through the tunnel washing process being recycled to the main tank via a large filter tray.

The product is suitable for industries such as: fruit and vegetable packaging plants and pack houses washing collapsible crates for tomatoes, asparagus, mushrooms; meat and poultry processing washing hatchling trays, for chicken processing; fisheries washing mussel crates, fresh fish and fish filleting bins; and nurseries for washing seedling trays and all grade plant pots.

The product requires low levels of maintenance and human input, can be integrated into existing lines or used in a newly established site, and can be used year round or for seasonal high-capacity events.

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Spoilage matters:

bacteria ID to help apple juice producer

Apple juice producers have more help to avoid spoilage in their products thanks to a new Cornell University study that identifies three new bacteria species, one of which fouls up the flavour.

The three new species — *Alicyclobacillus mali, A. fructus*, and *A. suci* — all belong to the genus *Alicyclobacillus*, but *A. suci* was found to produce a compound called guaiacol, which is known in other *Alicyclobacillus* species to create a medicinal, smoky or rubber-like flavour in shelf-stable apple juice.

While *Alicyclobacillus* bacteria can affect juice quality and lead to spoilage, they are not a food safety concern.

"Better understanding the structure of the *Alicyclobacillus* genus and the spoilage potential of individual species drives improvement in quality management decisions that reduce waste and improve customer satisfaction," said Abigail Snyder, assistant professor of microbial food safety in Cornell's College of Agriculture and Life Sciences and senior author of a paper published in the *International Journal of Systematic and Evolutionary Microbiology*. Katerina Roth, a graduate student in Snyder's lab, is the paper's first author.

The findings will allow manufacturers to identify whether their juices contain *A. suci*, which leads to spoilage. It will also help them fine-tune their *Alicyclobacillus* control strategies and will support the development of tools and diagnostic technologies for the industry, Snyder said.

Apple juice is acidic and is often heated during pasteurisation, conditions that inhibit most bacteria. Unfortunately, *Alicyclobacillus* bacteria are extremophiles whose spores are capable of surviving extreme heat and high acidity. The bacteria originate from orchards and soils and can contaminate apples used for making juice. After juice has been processed and bottled for such products as apple juice, concentrates, teas, sports beverages and coconut water, spores can germinate, grow and produce guaiacol, causing spoilage. Also, the effects are not visible; the drinks appear fine.

Once spoiled, producers may be forced to throw products away, and if sold, unhappy consumers can lower a brand's reputation, Snyder said.

"It's a significant quality defect that you can't see ahead of time, and you can't control through conventional inhibition or inactivation strategies used to manage other food quality issues," Snyder said.

The researchers used genomic, biochemical and phenotypic analyses to identify the three new *Alicyclobacillus* species.

CASE STUDY

Fine Food Holdings works with Enmin for strong results

Fine Food Holding (FFH) has used equipment from Enmin to grow from a small staff of six to over 250 employees in just seven years. FFH produces crackers with grains, fruits, nuts and herbs and its products end up on store shelves all around Australia. About 20% of its business comes from exports to the international market.

Enmin has provided a range of different equipment to Fine Food Holdings: biscuit handling systems, vibratory feeders, cheese depositing systems, biscuit breaking equipment, conveyors and operator work platforms. FFH needed equipment that could be run 24 hours a day, six days a week so reliability and uptime were a key driver in their decision of who to work with.

"One of Enmin's key strengths is their ability to design and fabricate a customised product that suits our specific production needs. When we've needed a piece of equipment to solve a particular issue they've always taken on the challenge and ultimately provided us with a high-quality bespoke unit," said Fine Food Holding founder Jim Leckey.

Leckey worked in FMCG prior to founding FFH so he understood that the company would be a reliable partner for the new venture.

"I've had a long association with Enmin spanning 15 years and in particular with General Manager Anthony Gallaher. When we started FFH we needed a range of vibratory equipment and other material handling solutions and time was of the essence. My previous dealings with Enmin provided me with the confidence that they could meet our equipment requirements and crucially our time frames. We were not let down."

Enmin Pty Ltd
www.enmin.com.au

Wireless torque technology

Sensor Technology has launched a range of non-contact torque sensors based on a full four element strain gauge bridge design, complementing its existing non-contact sensors that use surface acoustic wave (SAW) detection.

Designated the TorqSense SGR510/520 series, the units have a 250% overrange reading capacity, allowing sudden spikes in torque to be measured and recorded accurately. The design also compensates for any extraneous forces (such as bending moments inadvertently applied to the sensor), improves sensitivity and has a wide temperature tolerance.

The bridge is essentially four strain gauges glued onto the shaft that is to be monitored in a square formation set at 45° to the axis of rotation. Thus, when torque is applied to the shaft, two gauges are stretched into tension and two go into compression.

A rotor mounted ultra-miniature microcontroller, powered by an inductive coil, measures the differential values in each strain gauge and transmits them back to the stator digitally, via the same coil. The SGR510/520 series transducer then uses state-of-the-art strain gauge signal conditioning techniques to provide a high bandwidth, low-cost torque measuring solution with high overrange and overload capabilities.

The measuring range of the series is 1 to 500 Nm (with models up to 13,000 Nm available shortly), accurate to +/-0.1% and with a resolution to +/-0.01% of the transducer's full scale The digital transmission between rotor and stator cuts out all cyclic fluctuation of the signal due to shaft rotation and generates a digital sample rate of 4000 samples per second.

Other features include an optional adjustable moving average filter, power supply range from 12 to 32 VDC, user configurable analog output voltages, a choice of RS232 communications, USB interface, CANbus interface, external Ethernet gateway and LabView virtual instruments.

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Air cooled chillers

MTA chillers and heat pumps are specifically designed for the food and drink industry. Featuring the TAEevo Tech industrial process cooling chiller, the chillers have a cooling range from 2 to 260 kWr.

With a chilled water supply temperature range from 30°C down to -10°C for the standard range, and down to -24°C for LWT version, MTA's TAEevo Tech range offers swift adaptability to rapidly changing requirements and ensures all phases in the process are catered for, even in the harshest conditions.

Flexibility to user needs is ensured thanks to MTA's unique evaporator configuration which allows the unit to operate with high flow rates and reduced pressure drops to ensure continual temperature control.

MTA is a European-based manufacturer and global supplier of commercial and industrial water chillers for both HVAC and industrial process applications covering a cooling capacity range between 2 and 1943 kWr. The product range includes cooling-only and air to water heat pumps chillers, purpose-built laser chillers, covering both air and water-cooled condenser configurations, with high-efficiency and low-noise options.

The products are suitable for a large portfolio application range from industrial process cooling requirements such as food and drink, mining, biogas solutions, wineries, concrete cooling, laser cooling, plastics extrusion compressed air dryers, medical applications such as MRIs, Linac, PET, etc to traditional chilled water air conditioning applications.

MTA chillers and heat pumps offer a plug-and-play, all-in-one solution for food and drink applications. With a robust design and fitted with quality components, chillers are purpose built for industrial applications.

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Cadbury to transition to recycled packaging

Mondelēz International has announced it will source recycled plastic using advanced recycling technology to use in a range of Australia's Cadbury chocolate blocks.

Cadbury has partnered with Taghleef Industries to source the equivalent of 30% of the plastic needed to wrap Cadbury Dairy Milk family blocks from recycled sources. The look and feel of the recycled plastic will remain the same with Amcor providing the finished packaging material.

Darren O'Brien, Mondelēz International President for Australia, New Zealand and Japan, said the company's investment in this emerging technology was a reflection of the increased focus on waste and expectation for brands to lead in sustainability solutions.

"Not only is this a world first for Cadbury, but Cadbury in Australia will be amongst the first anywhere in the world to buy recycled content soft plastic packaging. We're setting new ground in finding solutions to meet the National Packaging Targets and the broader global challenges presented by packaging waste.

"While we've accessed the very latest technology from overseas to source this recycled material, we know that demand for circular packaging will continue growing and we'd love to see recycling technology built in Australia to meet local demand," O'Brien said.

Simon Roy, Vice President and General Manager, Amcor Flexibles Australia & New Zealand said that Amcor was proud to be part of the solution, supporting the development of new technologies to help deliver local sustainable packaging.

"Our goal is to create safe, strong and secure packaging solutions partnering with our customers to help meet consumer needs. Reaffirming our commitment to ensuring all our packaging is designed to be recyclable or reusable by 2025."

Taghleef Industries Asia Pacific's Chief Operating Officer, Elie Jarrous believes that "the emergence of at-scale advanced recycling facilities opens up new opportunities to accelerate progress towards a Circular Economy".

The recycled plastic material will be used for the Cadbury Dairy Milk family blocks range made at the Cadbury Hobart factory. At this stage, the recycled plastic material sourced equates to about 30% of the required plastics needed to wrap these products. This is just the first step to use recycled soft plastics as a circular material as the company is determined to increase the amount of recycled material in its packaging.

The first Cadbury Dairy Milk blocks to include recycled soft plastic in their packaging will be available in Australian supermarkets from September 2022.

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Snack company introduces compostable bags

Frito-Lay, the large American snack manufacturer, has introduced compostable bags for its chips. They are being introduced as a pilot program for two of its Off the Eaten Path products. The compostable bags are part of PepsiCo's (the owner of Frito-Lay) push to reduce waste and move towards a circular economy that sees more products recycled or composted and landfill-bound waste reduced. Frito-Lay is aiming to have all its bags be recyclable, compostable, biodegradable or reusable by 2025. The bags, made of plant-based ingredients, create 60% fewer greenhouse gas emissions than traditional packaging and the technology can be freely licensed by other manufacturers who may want to use it for their own products.

The composting is done via TerraCycle. Consumers will be able to return the package to a designated compost location or go to a website to organise a pre-paid shipping label that can be used to send back the bag for composting.

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CASE STUDY

Serving up aluminium-free paper-based packaging

Mondi and Unilever have jointly developed a high-barrier, paper-based packaging material for Unilever's Colman's dry Meal Maker and Sauces range by reducing plastic, increasing paper content and consequently ensuring recyclability in the existing UK paper waste stream.

The previous unrecyclable multi-material laminate has been replaced with recyclable paper packaging. The aluminium, as well as all unnecessary plastic layers of the previous material, were eliminated. This resulted in a new packaging solution with paper content of 85% and a thin functional plastic layer that seals the packaging and provides barrier protection for the food. The R&D teams identified this layer as the minimum acceptable protection needed to ensure a long shelf life while maintaining high quality and reducing food waste.

Starting with a proof of concept, followed by extensive line trials at both Mondi and Unilever's R&D pilot plants, provided the flexibility to quickly prototype and test the unique packaging material before scaling up.

Fikerte Woldegiorgis, Foods Marketing Director, Unilever UK&I, said: "At Colman's, we're big and bold when it comes to our flavours, and we're keen to make equally bold steps when it comes to our sustainability commitments. We are delighted to partner with Mondi to develop this recyclable paper packaging, becoming the first big brand within the category to do so. The new packaging, which uses a paper base, ensures that shoppers can enjoy the same great-tasting product they know and love, and now with the added benefit of being able to recycle the packs."

Torsten Murra, Global Head of Key Accounts Consumer Flexibles, Mondi, added: "MAP2030, Mondi's action plan for the next 10 years to achieve our ambitious 2030 sustainability commitments, focuses on circular-driven packaging and paper solutions, created by empowered people, taking action on climate. By working closely with Unilever, we were able to co-create a packaging solution that will deliver on all counts and is recyclable, providing a valuable resource for the circular economy to drive real change towards a more sustainable future."

Mondi Group
www.mondigroup.com/en/home/

Large-volume PET bottling machine

In order to supply the growing market for large-volume containers, the Krones Group has expanded its product portfolio.

The Contiform 3 BigBottle produces containers with a volume of up to 8 L. Featuring 10–14 cavities, it can produce approximately 10,000 to 16,800 containers/h. It is also able to handle smaller formats from a volume of 2 L upwards.

As far as container dimensions are concerned, a net height of max 380 mm and a diameter of up to 190 mm are possible. Preform dimensions are max 170 mm for net length, max 23 mm for neck finish height and max 53 mm for neck ring height.

Bottlers who want to operate their large-container production in the lower speed range, will find the requisite technology at Kosme as before. The Krones subsidiary's machines feature four, six or eight cavities and produce containers with a volume of up to 11 L. Linear machines for containers holding up to 30 L round off the portfolio.

As a large-container machine in the higher output range, the Contiform 3 BigBottle closes a gap in the group's portfolio. Something the stretch blow-moulders from both Krones and Kosme have in common is that they are suitable for handling recycled PET and can be block-synchronised with other machines.

Krones (Thailand) Co Ltd
www.krones.co.th

Food and drink label calculation software update

Zubi food labelling software has launched its latest update, a calculation function for reconstituted food and drink products.

Now live for all account holders to use, the function offers a new way for manufacturers of food and drink that must be reconstituted with water before consumption, to calculate nutrition information panels (NIPs) accurately, quickly and securely.

The function is suitable for companies that have dried products that are reconstituted, such as powdered drinks, where the NIP on the label needs to show values for the powder when it has water added and is ready to drink.

The easy-to-use function can also reduce the current three-step process to one step.

Zubi Ltd
zubionline.com

PVDC-free screwcap wine closures

Jet Technologies, alongside wine product company Vinventions, has launched Vintop: a range of sustainable screwcap wine closures whose liners are free of polyvinylidene chloride (PVDC) as well as BPA. PVDC is a commonly used material in packaging that can also be toxic when burnt, making it an environmentally unfriendly chemical. Its replacement means that the wine closures offered in this product range are designed to be more sustainable and less environmentally damaging.

The product range has been developed to be less environmentally impactful while also providing the same qualities that producers would look for in a wine closure, such as consistent oxygen management of a bottle's contents. Additionally, the product line is customisable and offers a range of design options from traditional offset printing to hot-foil printing and embossing in order to attract the eye and stand out to the consumer.

Jet Technologies
www.jet-ap.com

Reusable bottlebridge for glass bottles

DW Reusables' Bottlebee is a reusable bottlebridge designed to provide the same convenience of cardboard bottlebridges but with reduced waste.

Made from post-consumer material or regrind plastics, it is designed to last for years before being completely recycled into a new Bottlebee.

Suitable for full, sealed bottles as well as empty bottles with no bottle cap, it can hold bottles tight below the top, unlike conventional carton versions that are held in place by the bottle cap.

The packaging is brandable and can be stacked two layers high. It's also compatible with existing beverage crates as it is placed on the bottles in the crates and can be designed for any shape of bottle or crate.

DW Reusables
www.dwreusables.com

Scented packaging canister

Airnov Healthcare Packaging has expanded its range of Aroma-Can products to incorporate a wider range of flavours and scents.

Strawberry and mint options have been added to the range of products, which are injection-moulded with a specially scented polymer compounded into the resin to release over time.

Designed to drop into packaging, the cans emit a pleasant aroma made to mask unwanted odours typically found in some herbal and nutraceutical products. They are also used to enhance the customer experience and brand appeal by adding an associated aroma to vitamins, probiotics and other dietary supplements.

The Aroma-Can has the same shape and size as Airnov's standardised 1-gram desiccant canisters, making the product compatible with canister insertion equipment readily available on the market.

The new flavours join the existing core range of orange, lemon and vanilla, with custom scents made to meet specific user applications.

The product is US FDA compliant for use in nutraceutical and food applications.

Airnov Healthcare Packaging
www.airnov-healthcare.com

FMCG Industry Solutions has launched a test kit for gluten, expanding its product portfolio for food allergens. The AgraStrip Gluten G12 is a lateral-flow device for on-site factory testing to verify the presence of gluten in the environment or products.

The kit uses a next-generation antibody called G12 that targets the most immunotoxic proteins for consumers intolerant to gluten. Call us know and learn how to prevent allergen cross-contamination.

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AUSTRALIAN INSTITUTE OF PACKAGING

Nerida Kelton MAIP, Executive Director – Australian Institute of Packaging (AIP);
Vice President, Save Food Packaging & Food Waste – World Packaging Organisation (WPO)

Sustainable coffee: inside and out

Australians love coffee; whether sipping it in a cafe, watching a friend proudly make you a latte on their 'new' machine or ordering coffee pods to make your favourite blends at home.

Buying behaviours have also changed and consumers expect more from their coffee. Coffee must be sustainable inside and out, starting with the way it is grown, sourced, staffed, manufactured and, more recently, how it is packaged.

Coffee packaging needs to have all the necessary functional barrier properties to maintain optimal freshness and shelf life, be airtight, protect from sunlight, be durable; all the while offering the lowest environmental impact.

Three innovative coffee packaging designs that stood out at the 2021 Australasian Packaging Innovation & Design (PIDA) awards that tick all the boxes are SIPP Instant, Melbourne Coffee and PodPress Capsule System.

SIPP Instant

SIPP Instant has created a different product to the traditional instant coffee category. The organic and Fairtrade product contains heat-resistant probiotics, complex healthy carbohydrates for slow energy release and freeze-dried Columbian coffee.

The company's new packaging was designed to elevate the functionality of the brand and features an ABA certified home-compostable internal film. The principal cellulose material is a renewable raw material from eucalyptus trees in South America. The cardboard exterior packaging is made of 100% recycled cardboard and non-toxic inks. The cardboard box features a window to show the product and the compostable film inside, to appeal to the customer's curiosity. Each panel of the box has a purpose: instructions/process of making the product; health benefits and ingredients; and messaging around its sustainable practices.

SIPP Instant wanted the packaging design for its new-concept product to be easy to understand with a colour palette that is eye-catching and contrasts with the dark colour palette traditionally used for instant coffee.

SIPP Instant was recently awarded Gold in the PIDA Awards — Beverage Design of the Year category.

Melbourne Coffee (Cyclpac)

The Melbourne Coffee concept evolved from a desire to challenge the space of flexible packaging and create a mono structure material for coffee. The company created a recyclable, sustainable solution for coffee that could replace the traditional 'mixed' laminate packaging materials.

The packaging is 90% LDPE, has a technical barrier to gas and vapour, a mono structure lamination, BOPE, 7 Layer high barrier coextrusion with EVOH, reverse or surface printed. Developing the sealant layer to hold the release valve internally was essential to the development and required some variant testing. When producing a 90% PE mono structure, the resistance to heat offered by the BOPE was critical to product performance and success.

The material (Mono structure PE with barrier to Vapour and Oxygen) is recyclable and complies with the Australasian Recycling Labelling Program in ANZ and the sister-program called OPRL in the United Kingdom.

The Melbourne Coffee packaging is designed to encourage consumers to 'Make a Difference' and to 'Recycle Me'. To Melbourne Coffee, the packaging is as important as the coffee.

Melbourne Coffee (Cyclpac) was recently awarded Gold in the PIDA Awards — Sustainable Packaging Design of the Year — Recycle category.

PodPress Capsule System (REFLO)

The lightweight, compact PodPress Capsule System has been designed as a sustainable alternative for those who drink their coffee from in-home machines that use pods. With sealed packaging of ground coffee in the form of completely re-usable capsules and 100% recyclable foil seals, the system allows users to refill any number of capsules and coffee types, install a new cover and store capsules for future use.

The aluminium foil closure is 100% recyclable and if balled up to sufficient size — approximately 30 mm diameter — can be captured by recycling streams. The PP capsule bodies that carry the ground coffee are easily cleaned and reusable. If desired, the capsules can be packed together, and in packs of nine can be easily captured in the recycling systems of cities, once again diverting them from the waste stream and landfill.

The used coffee grounds are readily removed from the capsules, and can be used for garden composting, or simply spread on the topsoil, providing an inert protective layer for home garden plants. The system itself can be produced using recycled material to complete its participation in the circular economy. The Podpress reusable and resealable coffee capsule system is designed to capture all the plastic packaging for capsule-based coffee usage and divert it from landfill.

Given that Australians use more than 3 million coffee capsules per day, uptake of the Podpress system by even a small proportion of capsule users could make a significant reduction to the number of spent capsules ending in landfill.

PodPress Capsule System (REFLO) was recently awarded a silver in the PIDA Awards — Sustainable Packaging Design of the Year — Reuse category and a bronze in the Beverage category.

Coffee is not only one of the most traded agricultural commodities in the world, but it is also a favourite pastime for many people. Next time you are buying your coffee look out for brands that are making a sustainable difference inside and out.

Absorbency pads for meat and fish

Elliott Absorbent Products has developed a thin high-absorbent range of sealed edge pads for fresh meat and fish.

Designed to replace airlaid and SAF pads, the UniDry range uses a proprietary Infinity Core that provides good absorbency of blood and water of between 7.5 and 26 L per m^2.

The product is claimed to have a low carbon footprint and uses fewer materials than traditional pads. According to the company, tests reveal that it uses half the cellulose and plastic required to make traditional pads and due to its thin construction is easier to transport and store.

According to absorbency tests that compared it to a traditional pad, UniDry was 45% more absorbent when used with a typical 600 g lean beef joint, 90.5% with a 1.3 kg piece of topside and 278% more effective with a 135 g venison steak.

Available in both pads and reels, the product comes in white as standard with other colours upon request. It has full EU migration conformance and is manufactured in the UK.

Elliott Absorbent Products Ltd
elliottabsorbents.co.uk

Total milk allergen test

FMCG Industry Solutions is now offering the Romerlab AgraStrip for testing total milk allergen. Previously, to test for the presence of milk allergens, processors had to decide whether to look for casein or beta-lactoglobulin as an indicator for allergenic residues.

With the AgraStrip Total Milk, it is possible to test for both at the same time.

The product is based on lateral flow technology, which means that results are available in around 11 minutes without the need for any specialised equipment.

It is easily implemented into routine analysis as part of an allergen management plan. The simple test format makes it easy for a smooth workflow to be maintained onsite within a manufacturing environment as well as in the laboratory.

Results are read visually, and the limit of detection is 1 ppm of milk protein. The test is suitable for all food manufacturers and as a final verification of their processes.

These tests can be used for different applications, and cover all steps in the food production process: testing of raw materials and finished food samples; analysis of rinse waters (as part of cleaning validation); and detection of allergens in environmental swab samples.

FMCG Industry Solutions Pty Ltd
www.fmcgis.com.au

Probiotics for the pet food industry

Chr. Hansen has introduced a portfolio of stable live probiotics for use in pet foods and supplements.

Now targeting the pet food and pet supplements industry in the United States, Chr. Hansen launches a line-up of three live probiotics each covering the needs related to a specific life stage of dogs and cats.

PET-PROSTART is a probiotic technology for growing puppies and kittens, as well as for their mothers during pregnancy and lactation; PET-PROESSENTIALS is a probiotic technology for essential needs during adulthood, supporting normal health and everyday wellbeing; and PET-PROVITAL is a probiotic technology for senior dogs and cats above seven years of age.

Chr. Hansen
www.chr-hansen.com


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Food fraud detection:

a low-cost approach

Food fraud can cause billions of dollars in economic damage every year. Now botanists at the University of Basel have developed a model that can be used to determine the origin of food in a low-cost manner. The new method has been tested and validated on strawberries.

The most common type of food fraud is false labelling concerning the country of origin in order to maximise profits. For example, strawberries from Switzerland or olive oil from Italy can be sold at much higher prices than the same products from other countries. Food authorities and the food industry spend a great deal of time fighting false declarations of geographical origin, which is estimated to cost up to $50 billion each year.

One method for detecting food fraud is to determine the δ18O (delta-O-18) value of a product sample, which characterises the oxygen isotope ratio. Until now, this procedure has been time-consuming and costly as a case of suspected fraud involved not only collecting reference data from the claimed country of origin, but also comparative data from other regions to validate or disprove the product's origin.

Basel botanist Dr Florian Cueni has now developed a model in collaboration with Agroisolab, a company specialising in isotope analysis. This model is intended for use in simulating the oxygen isotope ratio in plants from individual regions, thereby eliminating the need for the time-consuming collection of reference data. The model is based on temperature, precipitation and humidity data and information about the growing season of a plant, all of which are available from publicly accessible databases.

Dr Cueni tested and validated the model on a unique δ18O reference dataset for strawberries collected across Europe over 11 years. The case study has shown that the model can simulate the origin of the strawberries with a high degree of accuracy.

"With minor adjustments to the parameters, our model can be used to determine all plant products," said Professor Ansgar Kahmen, who led the research project. This makes it possible to simplify and speed up conventional isotope analysis by simulating the regions of origin of agricultural foodstuffs.

In addition to food industry applications, the model is of interest to food forensics officials, drug-investigating authorities, and even NGOs such as WWF or Greenpeace with regard to determining the origin of illegally logged timber.

The research study was published in the journal *Scientific Reports*.

What's next for the cultured meat industry?

The global cultured meat market is predicted to grow exponentially in the next few decades as it looks to take on the trillion-dollar traditional meat industry, according to a recent report. However, the disruptive innovation faces significant hurdles to overcome as regulatory and technological challenges begin to mount.

Exponential growth forecasted

Cultured meat, otherwise known as cultivated meat or cell-based meat, is an emerging technology area that uses cultured animal cells to create meat-like food products.

Unlike plant-based meat or other meat analogues, cultured meat is produced from the same cells as conventional meat. It can theoretically provide a replica of the real thing without requiring animal slaughter and at a fraction of the environmental cost.

The sector has raised more than US$600 million in funding since 2015, growing from fewer than five companies to over 50 in the same time frame, according to insights from Cultured Meat 2021-2041: Technologies, Markets, Forecasts.

The report, produced by IDTechEx, forecasts the global cultured meat market will be worth $1.66 billion by 2031 and $11.13 billion by 2041.

According to a recent Market Data Forecast report, that is more than 50 times its current valuation.

Singapore leads the way

The cultured meat industry received a significant boost in December 2020, when the Singapore Food Agency (SFA) approved a "novel food petition" for cultured chicken produced by Eat JUST to be sold in Singapore as an ingredient in nuggets made by the company.

As a city-state with almost no agricultural land, Singapore imports over 90% of its food, making it highly dependent on other countries. To improve the country's food security, in 2019, the Singaporean government set up the "30 by 30" goal, which aims to produce 30% of the country's nutritional needs locally by 2030, using technologies including vertical farming and alternative proteins.

"The Singaporean government had previously been vocally supportive of cultured meat, and it is perhaps unsurprising that it was the first place to approve a cultured meat product for commercial sale," IDTechEx published in the report.

However, Eat JUST's cultured chicken is still very much an early-stage product. The company still uses foetal bovine serum (FBS) to produce its cultured cells, an expensive ingredient with high batch-to-batch variability derived from slaughterhouses, meaning that production is unlikely to be scalable in its current form and still partially relies on animal slaughter. The product

BlueNalu has carried out demonstrations of whole-muscle cell culture-based yellowtail amberjack. Image credit: BlueNalu

is also a blend of cultured cells and plant-based ingredients, possibly reflecting the high production costs associated with cell-cultured and the difficulty of culturing cells at a large scale.

"Nevertheless, it is a major step forward for the industry, and public, and media reactions have been almost uniformly positive," the report said.

There are hopes that the approval and commercial release in Singapore will influence other regions, accelerating approval processes worldwide.

Regulatory issues

Of the major markets across the world, the US and EU arguably have the most well-defined regulatory pathways. In the EU, the Novel Food Regulation explicitly mentions foods derived from cell and tissue culture and outlines a path to approval that could take as little as 18 months to complete.

In the US, the road ahead is less clear. However, in 2019 the US Food and Drug Administration (FDA) and US Department of Agriculture (USDA) announced a joint agreement for the regulatory pathway for meat products derived from cultured cells, other than cultured fish, which is likely to be regulated solely by the FDA. Although there are unanswered questions in both the EU and US, particularly around labelling requirements, the regulatory bodies are taking cultured meat seriously, and pathways to market are beginning to emerge.

Despite these initial steps, there are challenges with securing regulatory approval in both regions. The EU has historically been resistant to biotechnology innovations in food.

For example, the report said, the regulations around genetically modified organisms (GMOs) are among the world's most stringent, making it difficult to release GMO-containing products in the region.

Whether or not cultured meat products contain GMOs (and some suggest that it will be difficult to create a commercially viable product without some form of genetic modification), it is perhaps a worrying precedent for companies hoping to release products in the EU.

This is less likely to be an issue in the US, although approval involves interacting with two separate regulatory bodies — the FDA and USDA — which may complicate the process. Each body may have different data requirements and timescales, and the exact roles played by each body are not yet clear. Nevertheless, IDTechEx believes that the US is the more likely of the two regions to see the first approvals of cultured meat.

A challenge common to both the EU and US is the potential resistance from industry lobbyists and labelling restrictions. In both regions, plant-based substitutes for animal products have faced similar challenges.

In 2019, the US state of Missouri passed a law banning the term "burger" from being used in relation to plant-based meat, according to the report.

"In 2017, the European Court of Justice banned vegan food producers from using terms such as 'oat milk' and 'soya yogurt' on their packaging, reinforcing this in 2021 with a move to ban producers from even using terms or imagery on packaging which refer to or invoke dairy products to avoid misleading consumers."

There are already signs that cultured meat may face similar resistance — in 2018, the US Cattlemen's Association filed a petition to the USDA requesting that the term "meat" only apply to tissue taken from a slaughtered animal. Arguments around labelling could significantly delay the release of products in both regions, particularly if they make demands the cultured meat industry finds egregious, such as banning the term "meat".

Cultured fish

One area that could provide a more straightforward path to market, particularly in the US, is cultured fish. Cultured fish products are likely to be solely regulated by the FDA, and there is much less concerted lobbying effort around the fish industry, meaning that regulatory approval is expected to be streamlined. In October 2020, the FDA issued a request for information on how best to label cultured seafood products.

"Interestingly, as of May, the USDA is yet to issue a similar request for cultured mammalian/avian meat, although it has signalled its intention to," the report said.

As a major market with significant global influence, regulatory approval in the US would be an important step forwards for the cultured meat industry. It would likely lead to approval in many other regions, as well as a big surge in investment into the industry.

IDTechEx predicts US-based cultured seafood companies, such as BlueNalu, Wildtype and Finless Foods, may be worth watching in the near future.

BlueNalu became the first cultured meat producer to release design schematics for a large-scale production facility in 2019. The company aims to produce cultured fish in 2000 L batches by the end of 2021 and 200,000 L batches within the next four years. With US$84.75 million in funding, IDTechEx believes the company is in a good position to become a leader in the early cultured meat industry.

For more information on this report, visit www.IDTechEx.com/CulturedMeat.

IDTechEx
www.IDTechEx.com.

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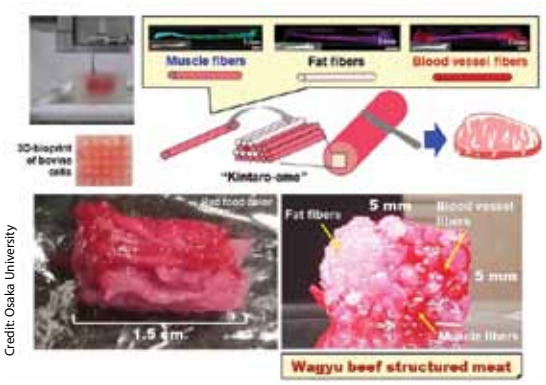
Future steak:
a personalised Wagyu beef alternative

Scientists from Osaka University used stem cells isolated from Wagyu cows to 3D-print a meat alternative containing muscle, fat and blood vessels arranged to closely resemble conventional steaks.

Wagyu can be literally translated into "Japanese cow", and is famous around the globe for its high content of intramuscular fat, known as marbling or *sashi*. This marbling provides the beef with its rich flavours and distinctive texture.

Currently, the only available cultured meat alternatives consist primarily of poorly organised muscle fibre cells that fail to reproduce the complex structure of real beef steaks.

Now, a team of scientists led by Osaka University has used 3D-printing to create synthetic meat that looks more like the real thing. "Using the histological structure of Wagyu beef as a blueprint, we have developed a 3D-printing method that can produce tailor-made complex structures, like muscle fibres, fat and blood vessels," lead author Dong-Hee Kang said.



Credit: Osaka University

Scheme of structured Wagyu beef meat by "3D printing kintaro-ame technology"

The team started with two types of stem cells, called bovine satellite cells and adipose-derived stem cells. Under the right laboratory conditions, these 'multipotent' cells can be coaxed to differentiate into every type of cell needed to produce the cultured meat.

Individual fibres including muscle, fat or blood vessels were fabricated from these cells using bioprinting. The fibres were then arranged in 3D, following the histological structure, to reproduce the structure of the real Wagyu meat, which was finally sliced perpendicularly, in a similar way to the traditional Japanese candy *Kintaro-ame*. This process made the reconstruction of the complex meat tissue structure possible in a customisable manner.

"By improving this technology, it will be possible to not only reproduce complex meat structures, such as the beautiful *sashi* of Wagyu beef, but to also make subtle adjustments to the fat and muscle components," senior author Michiya Matsusaki said.

This means that one day customers would be able to order cultured meat with their desired amount of fat, based on taste and health considerations.

The article, 'Engineered whole cut meat-like tissue by the assembly of cell fibers using tendon-gel integrated bioprinting', was published in Nature Communications at DOI: https://doi.org/10.1038/s41467-021-25236-9.

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March 2019 total CAB audited circulation (Aust + NZ):
6,528 readers (95% personally requested)

Printed and bound by Bluestar Print
Print Post Approved PP100007395
ISSN No. 1039-8414

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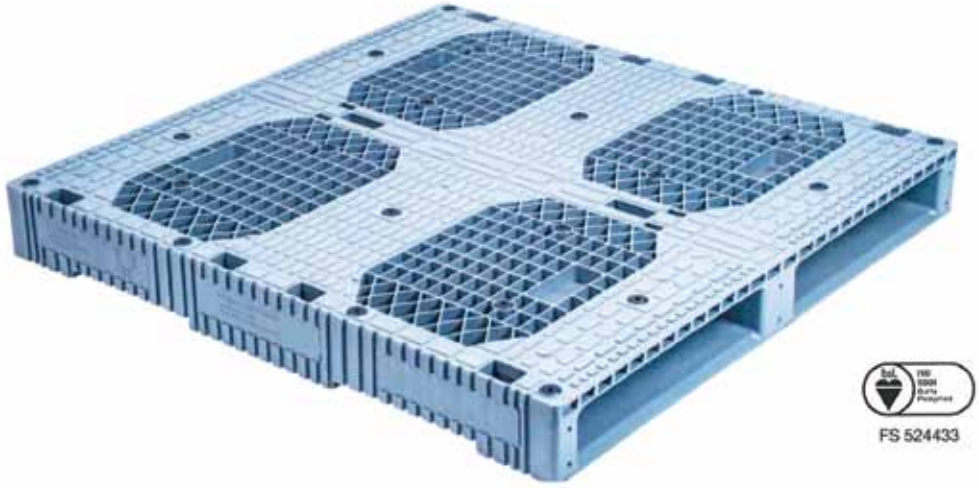

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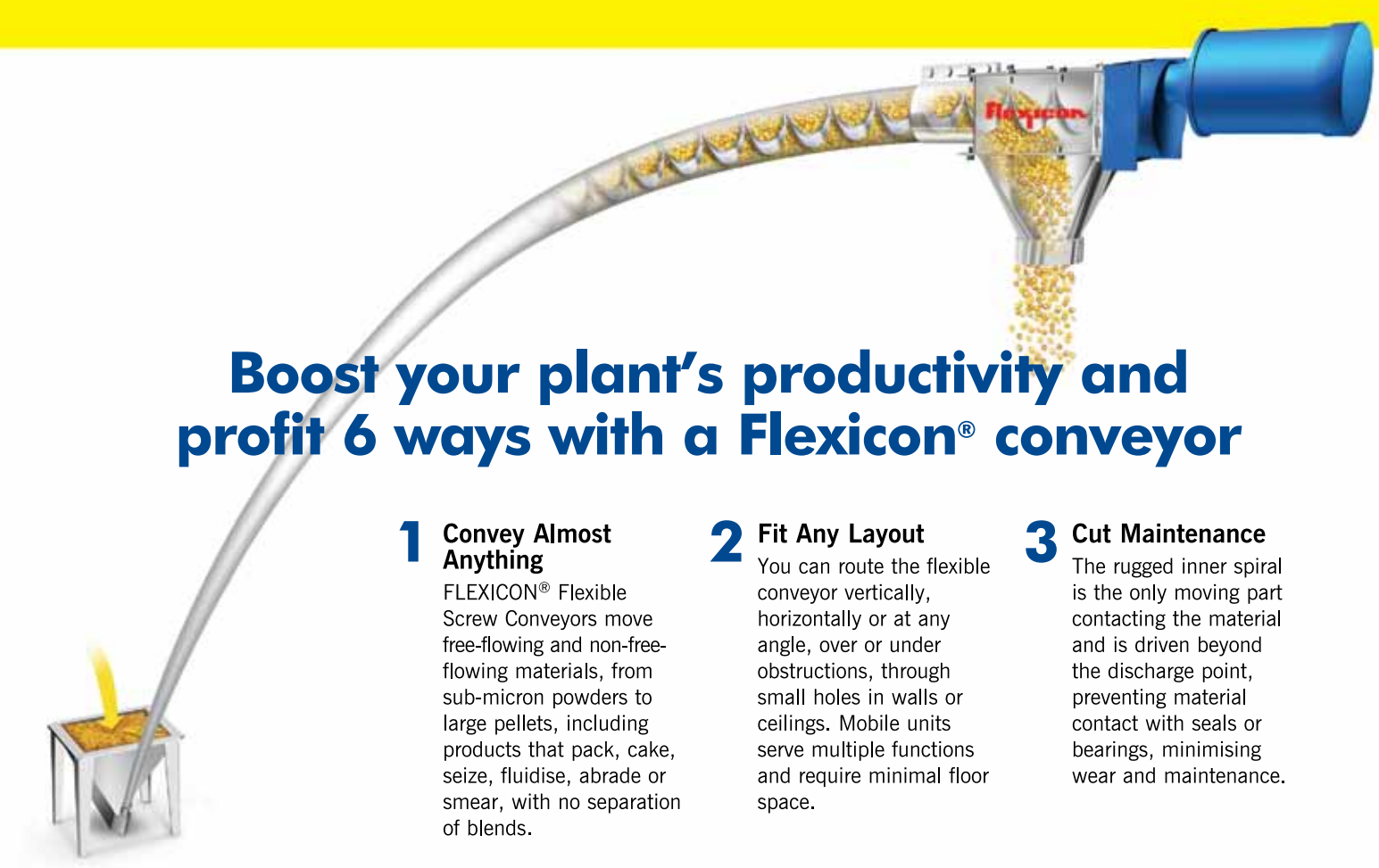

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JA-0886