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READ ONLINE!
This issue is available to read and download at www.foodprocessing.com.au/magazine
In a report, titled The Food Company of 2050, US-based Lux Research analysed start-up trends, social norms and corporate concerns to identify six megatrends shaping the food industry.

1. Developing food for health
Food needs to satisfy a lot more than appetites. Whether helping a consumer’s athletic intentions, cognitive performance or another aspect of health maintenance, foods and beverages are more frequently pushing beyond just claiming convenience, enjoyment and satiety.

Companies seeking to survive the coming decades will need to focus product development efforts on ‘better-for-you’ products and specific performance-related ingredients.

Lux predicts that nearly all products sold will pivot to make health-related claims, with the aim of reducing dependence on medical intervention. Products will also need to pivot to be more sustainable in terms of reducing food waste, working towards decarbonisation efforts and providing sustainable packaging.

2. Incorporating ubiquitous sensing
As sensors get smaller, cheaper and more powerful, their inclusion in all processes becomes imperative. They are given roles of monitoring food quality, food safety and even consumer health.

Keeping ahead of the curve in this regard will enable a more efficient and profitable business in the years to come, according to the research.

“The global pandemic is generating renewed urgency around virus sensing and self-monitoring and has also changed the consumption habits of consumers,” Hayes explained. “Understanding how consumption is changing, including the shift to fresh foods and plant-based proteins, and how allergens are impacting people’s lives, will be key to future success.”

3. Increasing sustainability
Corporate statements and greenwashing will not suffice in the future. Truly doing more with less must be the aim — from packaging to production and distribution.

4. Adapting to new industry structures
Subscription and delivery options, personalisation, food safety and traceability, and the incorporation of digital tools to drive faster, cheaper food innovation will all be key for major food companies to compete with their smaller, more agile competitors. Lux said it will also be important for food companies to reframe their identities as part of this adaptation to new structures to understand the role they can play in agricultural production and addressing consumer health needs.

5. Understanding future consumption
COVID-19 has accelerated some changes, but others were already underway to alter consumption patterns fundamentally.

Understanding the future needs of a product’s demographic or target market is key to ensuring longevity.

6. Mastering the role of the microbiome
From production methods to diagnostics, mastering this realm will be make or break for food companies, the report said.

The industry is only just beginning to scratch the surface on the insights into the function and composition of microbial communities.

For more information about the report, visit www.luxresearchinc.com.
Optimising food plants for worker safety

The COVID-19 pandemic has threatened the food supply in the United States, in part due to food industry workers falling ill, which reduces the workforce and can lead to temporary facility shutdowns.

A project by Cornell University will use computer modelling and outreach to find optimal strategies to minimise cases and transmission among workers in food processing facilities while maintaining the best possible production.

Researchers will collaborate with a dozen meat, dairy and produce industry partners to explore potential solutions in real-world settings.

Lead researcher Renata Ivanek said the project will address current issues while also providing valuable insights for future disease outbreaks.

“This is a problem that requires rapid solutions. We need to solve this right now,” Ivanek said.

Keeping workers safe in the food production industry has been a challenge since they often need to work close to each other, increasing the risk of transmission.

Many companies have tried to address the risk by shutting down a portion of their production lines and adding plexiglass dividers.

However, this has reduced production capacity and has added to the complexity of maintaining production flows, as each facility is unique.

“Part of the project is to investigate how segments of the food production industry differ and how to develop control strategies that will fit a specific industry segment,” Ivanek said.

The project aims to develop mathematical models relating to how a facility produces food to how COVID-19 spreads in plants, and how one affects the other.

“The goal is to optimise by looking into different interventions that have already been proposed, and in some cases also implemented, and try to find the optimal combination of measures,” Ivanek said.

Once a model has been developed and validated, it will be scaled up and applied in several specific facilities to validate it in real-world settings.

From grape waste to wine bottle

Students at RMIT have developed a regenerative wine bottle made from upcycling the solid remains of grapes after vinification. The bottles are fully organic and biodegradable at end of their use.

The innovation has won a finalist position at the 2020 City of Melbourne Open Innovation competition and a spot in the RMIT Activator LaunchHUB program.

T’Wine — a concept focused on upcycling waste produced by the wine industry — was created by Master of Design Innovation and Technology (MDIT) students Amanda Pacheco Bravo, Shimroth John Thomas and Joseph Oliver Yap.

The students developed a range of products including reusable bottles and a service-based app that is used to manage purchases with a digital label.

Thomas said the group began by exploring biopolymers for the concept while keeping in mind a circular approach. “We made a conscious effort to choose a waste material that wouldn’t compete with a food source. This led us to grape waste, Australia’s largest horticultural waste sector,” he said.

The RMIT Activator LaunchHUB offers a 12-week program that will give the group financial, legal and business support in the lead-up to a launch. The students completed the project in a biodesign studio run by Industry Fellow and Lecturer Dr Ollie Cotsaftis.
**Tip Top bread tag**

Launching on South Australian shelves, Tip Top has announced a move to more sustainable packaging by introducing 100% recycled and recyclable cardboard bread tags.

Tip Top employs more than 4000 people and produces over 1 million loaves of bread every day, which are delivered to more than 18,000 locations. The bread tag initiative is designed to remove 11 million plastic bread tags from local waste streams by the end of 2021 and will eventually eliminate over 400 million plastic tags per year as they roll out the tags nationally soon.

The transition to recyclable bread tags is the first of a series of packaging innovations under the company’s new vision, ‘Feeding Aussie families more sustainably’.

Graeme Cutler, Director of Sales and CSR Lead, Tip Top ANZ, said, “Our goal is that by 2025, all Tip Top packaging will be 100% recyclable, reusable or compostable to help close the loop.

“Developed and produced through rigorous testing, the new sustainable bread tags promise no compromise on freshness and taste. Customers can expect to be provided with the same Tip Top quality that millions of Australians enjoy freshly baked every day and have trusted since 1958,” Cutler said.

Tip Top encourages consumers to recycle their cardboard bread tags in kerbside recycling bins by tucking the tag securely inside other paper or cardboard products, such as an envelope or paper bag, giving them the best chance of being recycled into a new product rather than being sent to landfill.

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**ACCC clamps down on Made in Australia frozen fish labelling**

Food manufacturer Simplot Australia has amended the country of origin labelling on 31 frozen fish products, from “Made in Australia” to “Packed in Australia”, following concerns raised by the Australian Competition and Consumer Commission (ACCC).

The frozen fish products were sold under the brand names Birds Eye, I&J, Neptune and one home brand product.

Following compliance checks across a range of frozen foods, the ACCC was concerned that the products displayed a Made in Australia mark when the imported frozen fish may not have been substantially transformed in Australia.

In order for a product to be labelled Made in Australia, the end product is required to be fundamentally different from its imported ingredients in either identity, nature or its essential character.

The products sold by Simplot’s brands used fish imported from a number of countries, including New Zealand, the United States and South Africa.

The ACCC’s view is that only minor manufacturing processes occur in Australia, and, when viewed collectively, the imported ingredients do not differ fundamentally from the manufactured goods.

Simplot believed that slicing, crumbing and par-frying of the frozen fish constituted substantial transformation, justifying the use of the Made in Australia mark.

However, after the ACCC raised its concerns, Simplot agreed to change its country of origin labelling on these frozen fish products.

ACCC Deputy Chair Mick Keogh said that processes that only change the form or appearance of imported ingredients or components no longer qualify as substantial transformation.

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**Waste brassicas turned into ingredients using CSIRO tech**

A ‘new food’ manufacturing company — Nutri V — has been formed by vegetable grower Fresh Select and CSIRO.

Using CSIRO-patented technologies, the company will turn surplus Australian-grown vegetables such as brassicas into ingredients, products and supplements that lock in the vegetable’s natural colour and flavour. Their nutritional content will also be enhanced thanks to CSIRO’s microencapsulation of healthy oils and gut health fermentation applications.

Dairy- and gluten-free, Nutri V ingredients are designed to help the environment as well as help to improve Australians’ daily vegetable intake.

According to Nutri V CEO John Said: “We’ll be able to minimise wastage by using the entire crop to make powder — ‘ugly veg’, stems and leaves as well — not just the retail-fit parts.”

According to Nutri V, roughly 7.5 g of powder is nutritionally equivalent to a full serve of vegetables. The company said the product works well added to fruit juices and smoothies, pasta or pizza dough, baked goods including muffins, brownies, crackers and bread, soups, sauces and even seasonings.

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Plant protein manufacturing facility opens in Sydney

Proform Foods has officially opened its $11m manufacturing facility for plant-based meats, located at Mount Kuring-Gai in Sydney’s north.

Opened by the Federal Minister for Industry, Science and Innovation Karen Andrews on 26 November 2020, the 1600 m² plant will produce 5000 tons of plant-based meat each year using 70% Australian ingredients.

Proform Foods is led by triple Olympian, World Champion and World Record Australian swimmer Matthew Dunn OAM, and founded by serial entrepreneur and food industry veteran Stephen Dunn. The company said it has perfected the taste and texture of plant-based meat after 15 years of development and it will be sold under the MEET brand with a 4.5 star health rating.

Proform Foods is a pioneer in the plant-based proteins space, having invested $2.3m in partnership with the CSIRO as its research provider in 2006. The business founders have since invested an additional $8m in research and development and $11m to facilitate the building of the specialised manufacturing facility.

With Australia having just signed the Regional Comprehensive Economic Partnership (RCEP), facilitating easier access to export markets, the facility will serve local demand and cater to the strong export potential for plant protein.

Matt Dunn, Proform Foods CEO, said: “We are incredibly excited to officially open the next-generation plant-based meat manufacturing facility. The global demand for plant-based products is booming, and our Australian innovation wins on both taste and texture. With plans already in the works to expand globally, we anticipate that the business will become a global leader in the US$4.3bn plant-based meat industry, creating new jobs and export growth in Sydney and across the country.”

Proform Foods currently produces 28 different products, including burgers, meatballs, ‘beef style’ strips, ‘chicken style’ tenders and mince. The MEET brand is available at a range of supermarkets around the country and will be in wide distribution across Australian and overseas markets in 2021. It is already a base ingredient in many well-known Australian brands.

Ministers amend controversial Health Star Rating changes

The Australian and New Zealand Ministerial Forum on Food Regulation has affirmed all fresh and minimally processed fruit and vegetable products will receive an automatic five-star rating under the revised Health Star Rating (HSR) plan.

At the meeting on Friday (27 November 2020), state food Ministers agreed that a 12-month stock-in-trade provision would be permitted for eligible products following a two-year transition period.

The news comes after heavy criticism from multiple industry associations after the Forum rejected the Commonwealth and farm industry proposal to lock in a minimum 4-star health rating for pure fruit and veggie juices.

AUSVEG, Australia’s peak industry body for the vegetable and potato industries, had said the rejection was “deeply concerning” and called for “common sense to prevail”.

Citrus grower industry body Citrus Australia also echoed the sentiments.

“What message does this tell the Australian agriculture industry and Australian consumers? The Health Star Rating system is broken beyond repair,” Citrus Australia Chief Executive Nathan Hancock said.

Agriculture Minister David Littleproud, who is a member of the Forum, launched a statement after it was initially proposed pure Australian fruit juices with no added sugar would be classified as less healthy than some soft drinks.

“It’s madness. Fresh, pure, vitamin-rich Aussie OJ is better than a soft drink every day of the week, and our Health Star Rating system should reflect this,” he said.

At the Forum’s request, further consideration was given to the treatment of fruit and vegetable juice (no added sugar) and other non-dairy beverages under the HSR system.

The Forum noted the Australian Government Department of Health will provide further advice to adjust the HSR calculator for 100% fruit and vegetable juices (no added sugar) for discussion at the next meeting, to be held in February 2021.

The Forum supported a proposal for a minor adjustment to the HSR review calculator to address an anomaly. Diet beverages will now achieve no more than 3.5 stars, as this option best aligns with the intention from the HSR Five-Year Review recommendations and with the Australian and New Zealand dietary guidelines.
Fires during summer 2019–2020 decimated entire vineyards in South Australia, Victoria and New South Wales, but smoke, which was far more widespread and insidious, seeped into grapes and into fermenting barrels, yielding unpleasant, unsaleable product.

Although the full extent of the damage caused has not yet been calculated, analysis from the Australian Wine Research Institute indicates that smoke taint alone costs the country’s wine industry tens to hundreds of millions of dollars each time a high fire season occurs.

Advances in a wide range of technologies could help growers and winemakers mitigate the negative impact of smoke taint and other unpredictable anomalies, such as frost, drought, pests and disease — and not just in Australia, but around the world. The Vineyard of the Future, led by Associate Professor Sigfredo Fuentes, a plant physiologist at the University of Melbourne, is an international consortium of scientists conducting leading-edge research to amass high-resolution data from vine to glass and analyse it in meaningful ways. Drones, satellite imaging, video analysis, and plant and people sensors combined with artificial intelligence — collectively called “digital agriculture” — give producers and sellers of wine an advantage in an industry riddled with uncertainty.

“This research could take out the guesswork from viticulture and winemaking, making them more predictable,” Fuentes said.

On the vine
Good wine starts on the vine. Delectable grapes depend on the weather and cultivation strategies, including irrigation, fertilisation, pest control and canopy management. Growers typically prefer smaller grape berries, which yield more grape skin and therefore more compounds, such as anthocyanins, tannins, resveratrol and

Making better beer and wine with machine learning

Lisa Harvey, MathWorks
polyphenols, that influence flavour and aroma. Lower yields of grapes with top-quality traits may actually produce higher revenue per acre, so it’s essential to maintain the balance between the vegetative and reproductive sections of grapevines, Fuentes said.

“No recipe fits all cases for viticulture, and here the implementation of new and emerging technologies is critical to assess all these factors to obtain good products,” he said.

Fuentes and his colleagues have developed technologies that rely on infrared thermal imagery and near infrared spectroscopy (NIR) analysis coupled with supervised machine learning modelling to measure smoke contamination in leaves and assess smoke taint in the grapes. Infrared cameras reveal a vine’s heat signature, which is disrupted by smoke. Using MATLAB, Fuentes and his team developed computer vision algorithms that use the heat signature to predict smoke contamination in canopies with 96% accuracy.

NIR data obtained using non-invasive handheld instruments reveals a chemical fingerprint from berries and wines that indicates specific smoke-related compounds and concentrations in near real time with high accuracy. Conventional methods available to growers require them to send grapes to a lab and wait six days or more for the results. But having the information in real time could help growers make decisions, such as whether to harvest untainted grapes separate from tainted ones, in order to minimise waste.

Further research has been conducted into predicting quality traits of potential wines from vineyards even before harvest. By incorporating other variables such as weather data inputs and known aroma profiles from previous vintages as targets, machine learning models were trained to predict the aroma profile of the wine coming from the vines.

An app called VitiCanopy uses a smartphone’s GPS and camera to help a grower measure a canopy’s size, density and vigour. From an image, the app’s computer vision algorithm calculates the leaf area index with a snapshot. Known as LAI, this important metric correlates the amount of sunlight dappling the berries, the canopy’s microclimate, the grape’s composition and ultimately yield. Wine growers are trying to create a balance between the leaves, the shoots and the fruit, Fuentes said. “If you have too vigorous of a canopy, the flavour and aroma profiles of the final wine are going to have too much acidity and green respectively,” he said. The information from the app enables a grower to make decisions about trimming a canopy, applying fertiliser and increasing or decreasing irrigation. “It’s all about balance,” Fuentes said.

NIR and machine learning algorithms can also lend clues to grape ripeness. Fuentes explains that certain compounds, released from dying cells inside the grape as it ripens, influence its aroma and flavour. Different grapes require different percentages of cellular death to reach their peak ripeness. “We propose measuring the cell vitality of berries before doing the winemaking to predict the quality of the wine using digital tools developed,” he said.

**On the nose**

Among the dozens of variables affecting — and potentially devastating — vineyards, an insect called phylloxera may be one of the most notorious. In the mid-19th century, French vintners unknowingly imported the insect from the United States when they brought American vine material, contaminated shoes or tools to Europe. Although phylloxera preferred to dine harmlessly on the leaves of American vines, when they discovered French vines, they went for the roots. The Great French Wine Blight nearly decimated the country’s wine industry in just a couple of decades. After several failed attempts to eradicate the insect, French vintners begrudgingly grafted their vines to American vine roots, creating plants that could thrive in French soils and resist phylloxera.

Today, phylloxera remains a threat that is difficult to detect. Early signs, such as leaf discoloration and general canopy wilting, are frequently confused for water and fertiliser stress, and vintners are motivated to find a more reliable identification method. One approach has gone to the dogs — in a good way. With a dog’s nose containing 300 million more smell receptors than a human’s, resulting in 100 times the sensi-
tivity, dogs are being trained by researchers in the Vineyard of the Future to recognise the scent of pheromones released by phylloxera insects as well as other chemical compounds produced by the insect.

Wearing a backpack equipped with GPS-enabled smartphone, a dog will traverse a vineyard, its nose to the ground. Tracking algorithms developed using MATLAB Mobile detect the dog's location as well as its motion. Different actions such as running, walking and sitting when a scent is detected are added to a map to pinpoint problems in vineyard. “The app creates a log file for all of the points where the dog signals the handler by sitting, crouching or scratching,” said Claudia Gonzalez Viejo, a postdoctoral fellow working with Fuentes. The grower can then target inspections to those locations, saving time.

While the dogs were highly skilled at locating pests, they weren’t very good at determining the perfect beer aroma. To supplement the expert dog noses, Fuentes and his team have developed a low-cost, portable electronic nose, or e-nose, that has an array of sensors that are able to detect nine different gases, including ethanol, carbon dioxide, carbon oxide, methane and hydrogen peroxide. Gonzalez Viejo helped design the e-nose to scrutinise beer samples and predict aromas. But, she said, it has a wide range of applications, and could be tweaked to detect smoke damage in vineyards. Gonzalez Viejo envisions the technology being combined with a dog detector, used as a handheld device, or mounted to a drone and flown down rows. “We can take the e-nose anywhere,” she said.

In the glass
For all the work growers and producers do to make a quality wine, what constitutes good is subjective. “The best wine is the wine that you like,” Fuentes said.

Ultimately, understanding consumer reaction is key to selling wine, and Vineyard of the Future researchers have developed technology for that, too. The system, which was refined using beer but applies to wine and sparkling wine, incorporates a robotic arm, cameras and an e-nose. It begins with a perfect pour from the robotic arm, designed to fill a glass the same way each time without tiring. High-definition cameras trained on the beer capture visual data, including colour, foam formation and dissipation, and bubble size. An e-nose, positioned over the top of the glass, measures the gases released. Computer vision and machine learning algorithms crunch the camera and sensor information and position the beer amid a library of 250 others that have been previously analysed.

Aroma profiles conducted with the sensors were 97% accurate. Such technology could be attractive to craft brewers interested in maintaining consistency and quality control. “You can test every batch and get instant results,” Gonzalez Viejo said.

The team has even added consumer reaction to mix. Researchers used video cameras, infrared thermal imagery and brainwave headsets to measure heart rate, body temperature, brainwaves and facial expressions of staff and student participants as they drank different beers and wines or consumed food products. Their assessments of foam, colour, aroma, mouthfeel, taste, flavour and overall likeness of beers are being paired with the visual and e-nose data collected during a pour to increase accuracy.

Viticulture, winemaking and brewing are part art form, part science. As technology advances and scientific understanding of the processes occurring in the soil, the root system, the plant, the canopies and the atmosphere deepens, science may find an advantage. As wine and beer become more popular and demand grows, especially in a world with changing climate, emerging technologies could give growers and producers something to toast.
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Cheese global market trends

The global cheese market size is projected to reach US$155.49 billion (AU$210 billion) by 2027, exhibiting a CAGR of 3.7% during the forecast period, a report found.

The emergence of vegan cheese products will play an instrumental role in the development of this market, observes Fortune Business Insights in its report. With consumer food preferences shifting towards vegan food products, several vegan cheese brands are gaining traction in this industry particularly in the North American market. For example, New York-based Treeline Cheese makes 100% dairy-free probiotic cheese varieties. Another such company is Dr. Cow, a vegan cheese company based in New York that makes raw, organic and non-GMO cheeses from Indonesian cashew nuts, Brazilian nuts or Macadamia nuts. In Asia–Pacific, rising disposable incomes and spreading awareness about the health benefits of cheese will propel the market in the coming years.

**Market driver**

A market driver of the cheese sector has and will continue to be the potential benefits of cheese for diabetics, Fortune Business Insights said.

Cheese is claimed to offer health advantages to people with diabetes as it contains not only fats but also proteins and calcium. Proteins, for instance, are critical in balancing the blood glucose spikes that diabetics often experience after eating fatty foods. Most cheeses have a healthy amount of proteins and almost no carbohydrates. For example, 28 g of parmesan cheese contains 10 g of proteins, while cheddar consists of 7 g.

Moreover, academic research has shown that a balanced intake of cheese daily can lower the risk of developing type 2 diabetes.

For example, a study published in the American Journal of Clinical Nutrition in 2012 revealed that eating two cheese slices per day can reduce the risk of diabetes by 12%.

A more recent study conducted by the University of Alberta in Canada in 2019 found that eating regular or low-fat cheeses can aid in regulating blood sugar levels and improve insulin sensitivity. Thus, as awareness about the benefits of cheese for diabetics spreads, its consumption is likely to remain high for the foreseeable future.

**Competitive landscape**

Leading companies in the cheese industry are leveraging their distribution channels to improve and expand consumer access to their innovations.

For example, in August 2020, West Australia-based Brownes Dairy announced the production of cheddar cheese from fresh milk procured from dairy farmers in Western Australia. This move is claimed to make Brownes the only dairy company in West Australia to make traditional cheddar cheese from local milk in 14 years.

Another example was California-based Miyoko’s Creamery, which introduced a plant-based mozzarella cheese product in February. The cheese looks and tastes like its regular counterpart and can be used in Italian-style dishes, steak sandwiches, lasagnes and pizzas.

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**Enzyme for yoghurt**

Versilk has been added to the DuPont Nutrition & Biosciences (DuPont) Danisco range of enzymes. It is designed to help yoghurt and beverage manufacturers achieve good texture and taste in yoghurts, drinkable dairy products and other drinkable fermented products.

Dairy and beverage makers have long struggled with formulation of high-protein yogurts. Fortifying dairy or plant-based yoghurt to reach higher protein content can result in increased thickness and bitter notes in the final product.

This innovation is a viscosity-modulating enzyme for high-protein applications, giving manufacturers a new way to deliver the desired viscosity, mouthfeel and taste profile that meets consumers’ needs for an indulgent product with health benefits. It allows manufacturers of dairy and plant-based yoghurts to achieve up to 14% protein in the final product — a 30% increase over what is common today.

The product is also simple to implement into an established yoghurt production — it is added with the cultures and can help deliver potential improvement to both flavour and fermentation time, depending on the protein base. It is suitable for many types of products.

The product was launched in the North American market in December 2020.

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Following a successful trial period at its Colac site in Victoria, Bulla Dairy Foods (Bulla) has implemented a wearable contact tracing technology called Smart Badge across its sites, allowing the business to increase contact tracing efforts.

The small, wearable wristband device is worn by any team member, visitor or contractor at the food manufacturing site. It has been introduced as part of Bulla’s COVID-safe protocols, which include daily fitness-for-work declarations, temperature checking upon arrival, onsite COVID marshals, mask wearing, and increasing the availability of common areas such as change rooms and meal areas to minimise cross-contamination.

The technology is enabling Bulla to support efficient management of contact tracing in the event of a positive case and social distancing between workers, as well as maintaining capacity limits across the business. This is achieved by working in tandem with ‘nodes’ placed at the entrances to sites and key communal areas, capturing data in real time and providing enhanced contact tracing logs for the Bulla team.

As one of Colac’s major employers, providing approximately 700 jobs locally, Bulla CEO Allan Hood believes it was the dairy processor’s responsibility to its team and the broader local community to increase safety measures and introduce the technology across the business.

“The pandemic has been full of unknowns both for individuals and businesses, but one thing that remains the same for our Bulla family is that the safety of our team is our first priority. We’re thrilled to have partnered with Smart Badge as it’s been a seamless fit with our COVID-safe protocols and ensures the strength and safety of our working environment during COVID times.

“In addition to being an incredible assurance for the health and safety of our team, the technology has enabled us to effectively manage existing shift segregation, allowing precious minutes to be refocused back on to our production line, creating assurances for the future of our business as well,” said Hood.

With a rich 110-year history under its belt, Bulla has survived two world wars, a GFC and now two pandemics. As a business steeped in innovation, it is no stranger to pivoting and innovating to thrive in the wake of global events.

Bulla’s General Manager of People & Culture, Jacinta Munro, who has been instrumental in the rollout and success of Smart Badge at Bulla, highlights how important using COVID-safe technology is for an employer brand.

“The rollout of Smart Badge has been met with fantastic employee and union support and it has really been about letting our team know that their wellbeing is our first priority. The technology was implemented during one of our biggest recruitment drives to date, in a year when we have welcomed nearly 200 new team members to our sites in Colac, and it’s our pride and privilege to showcase to the local community as well as the wider business community how we emulate a safe workplace of the future through our COVID-safe protocols,” said Munro.

Smart Badge
www.smartbadge.com.au
John Bean Technologies (JBT) is a leading global technology solutions provider to high-value segments of the food processing industries.

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Researchers have found the distinctly funky cheese smells come from fungi communicating with bacteria, and how they communicate determines what the cheese has to offer.

The discovery, published by a team at Tufts University, found common bacteria essential to ripening cheese can sense and respond to compounds produced by fungi in the rind and released into the air.

The study said this process enhances the growth of some species of bacteria over others.

The composition of bacteria, yeast and fungi that makes up the cheese microbiome is critical to the cheese’s flavour and quality, so figuring out how that can be controlled or modified adds science to the art of cheesemaking.

Senior researcher Benjamin Wolfe said humans had appreciated the diverse aroma of cheeses for hundreds of years, but how these aromas impact the biology of the cheese microbiome had not been studied.

“Our latest findings show that cheese microbes can use these aromas to dramatically change their biology, and the findings’ importance extends beyond cheesemaking to other fields as well,” Wolfe said.

Many microbes produce airborne chemical compounds called volatile organic compounds (VOCs) as they interact with their environment.

An example of microbial VOC is geosmin, which can often be smelled after heavy rain in forests.

As bacteria and fungi grow on ripening cheeses, they secrete enzymes that break down amino acids to produce acids, alcohols, aldehydes, amines and various sulfur compounds.

In contrast, other enzymes break down fatty acids to produce esters, methyl ketones and secondary alcohols.

The way these enzymes break down the acids determines the cheese’s smell and taste.

But when certain VOCs were released near the cheese, the bacteria began to eat some of the VOCs, changing the cheese’s composition.

Co-author of the study Casey Cosetta said the bacteria are able to eat what we perceive as smells.

“That’s important because the cheese itself provides little in the way of easily metabolised sugars such as glucose. With VOCs, the fungi are really providing a useful assist to the bacteria to help them thrive.”

The researchers said there are direct implications of this research for cheese producers around the world.

“When you walk into a cheese cave, there are many VOCs released into the air as the cheeses age. These VOCs may impact how neighbouring cheeses develop by promoting or inhibiting the growth of specific microbes, or by changing how the bacteria produce other biological products that add to the flavour,” the study said.

A better understanding of this process could enable cheese producers to manipulate the VOC environment to improve the quality and variety of flavours.

Wolfe said the implications of the research could even extend much further.

“Now that we know that airborne chemicals can control the composition of microbiomes, we can start to think about how to control the composition of other microbiomes. For example, in agriculture to improve soil quality and crop production and in medicine to help manage diseases affected by the hundreds of species of bacteria in the body,” Wolfe said.
While there is no real agreement on who was first to make flatbread with toppings, whoever it was deserves gratitude. People all over the world love pizza, and the ever-increasing demand is accelerating the production of pasta filata. Claimed to be the largest, fastest growing segment and most globally widespread cheese type, pasta filata accounts for around 25% of cheese produced globally.

Currently in the pizza market, there is a distinct consumer trend towards whiter looking (less burned) pizza. Tony Salvador, commercial development manager, pasta filata at Chr. Hansen, said his company is focused on addressing customer needs with practical solutions.

As a result, Chr. Hansen has developed the F-DVS Pure Appeal culture that is designed to help pasta filata makers produce mozzarella type cheeses — and regional variants such as provolone, kashkaval, oaxaca and many more — with a tailored level of browning when the cheese is baked on top of pizza.

“Pizzerias pride themselves on expedient service with intent to deliver pizza to their customers from point-of-sale to consumption as fast as possible. Having predictable cheese performance, and appearance, is critical and oftentimes out of their control — especially ‘browning’,” Salvador said. “One key reason is the need to optimise pizza baking time for faster delivery, hence increased oven temperature, which ‘burns’ the cheese.”

The F-DVS Pure Appeal culture is designed to reduce the degree of browning by up to 100% and enables pizzamakers to achieve predictable appearance every time. At the same time, the solution helps protect the cheese from yeast and mould spoilage throughout the supply chain.

As the global demand for pizza continues to rise, the ability to control browning and quality becomes more important. The new culture from Chr. Hansen is designed to help meet these demands while also meeting consumer expectations for natural ingredients and sustainability.

CHR Hansen
www.chr-hansen.com
Two bulk bag dischargers and five flexible screw conveyors have doubled peanut butter production capacity at Once Again Nut Butter’s new 3440 m² dedicated peanut butter facility. The discharger/conveyor system delivers up to 1590 kg/h of raw peanuts to each of two roasters, for a total of 3175 kg/h. The new line provides dust-free operation and improves operator safety.

Founded in 1976 in the US, Once Again Nut Butter processes natural and organic products such as honey, sesame tahini and butters made from peanuts, almonds, cashews and sunflower seeds. As the new plant handles all of the company’s peanut products, the older facility established in 2004 for all nut and seed products will be able to operate peanut-free.

Feeding the new line are two Flexicon BULK-OUT bulk bag dischargers positioned side by side. Both are BFC models equipped with a cantilevered I-beam, hoist and trolley that lift and position the bag in the discharger frame without the need for a forklift. Five flexible screw conveyors, also from Flexicon, move the peanuts through successive steps of the process.

In the older plant, bulk bags containing peanuts were hoisted above the roaster and emptied directly into it. Compared to direct-emptying, “the bulk bag dischargers in the new plant are safer, automated and improve ergonomics for the operators”, said Peter Millen, Process Engineer at Once Again. The dischargers and conveyors enclose the peanuts, protecting them from contamination while preventing dust from escaping into...
the facility. Moreover, the new roaster is too tall to suspend a bulk bag above its infeed hopper.

Once Again installed the two bulk bag dischargers side by side, allowing one frame to discharge material while the other is reloaded, and to provide redundancy in the event one of the systems is offline.

The flexible screw conveyors transport the raw peanuts from the dischargers to a gravity separator and a de-stoner that remove foreign matter before the peanuts are discharged into a roaster, improving product quality over the direct-emptying method.

How raw peanuts are processed into peanut butter

Raw peanuts arrive in bulk bags weighing 1000 kg. The operator attaches the bag straps to the lifting frame, and actuates the electric hoist and trolley using a pendant to position the bag in the discharger frame.

The bag’s outlet spout is pulled through an iris valve which closes around the spout, preventing material flow. The operator then unties the drawstring, closes the access door and releases the valve slowly to prevent bursts of peanuts from displacing air and dust from the 156 L capacity hopper into the plant environment. A hinged lid on the hopper also permits manual dumping from handheld sacks.

The dischargers are fitted with pneumatically actuated FLOW-FLEXER bulk bag activators, which increasingly raise and lower opposite bottom edges of the bag into a V shape as it empties and lightens, promoting complete evacuation.

Flexible screw conveyors 6.1 m long transport peanuts from each of the discharger’s hoppers at a 45-degree incline before discharging into a gravity separator, which removes any foreign material that is lighter and less dense than peanuts, such as twigs or peanut shell pieces.

From the gravity separator, a third flexible screw conveyor, this one 4.6 m long and inclined at 45 degrees, takes the peanuts to the de-stoner, which removes any material that is heavier and denser than the peanuts, such as pebbles or metal fragments.

Peanuts are then loaded into a silo by a 15 m-long pneumatic conveying line and unloaded from it by another 15 m-long pneumatic conveyor line that terminates at the roaster. Roasted peanuts then proceed via a 21-m long pneumatic conveyor line to a blancher, which removes the peanut skins. Another 21 m-long pneumatic conveyor delivers the blanched peanuts to two holding silos.

From each silo, a 4.6 m-long flexible screw conveyor feeds peanuts to a roasted peanut transfer bin. From each transfer bin, a flexible screw conveyor transports peanuts to a 27 m-long pneumatic conveyor line terminating at the final grinding phase of the process.

All of the flexible screw conveyor tubes measure 114 mm O.D. and house a flat-wire spiral of the same pitch tested to yield optimum efficiency. Each conveyor’s drive motor rotating the screw is controlled by a variable frequency drive. The peanuts discharge from the conveyor below the point where the screw connects to the motor drive, preventing material contact with seals or bearings.

“For cleaning, the flexible screw is removed through a clean-out cap at the lower end of the conveyor tube, after which all components are blown down and/or vacuumed, and wiped clean with a surface sanitiser,” Millen said.

“A bulk bag discharger and flexible screw conveyors from Flexicon have reliably handled sesame and sunflower seeds in the original plant for several years. The equipment was familiar to plant staff, so it made sense to bring that technology over to peanuts.”

As part of specifying the unloading and conveying systems, the company’s peanuts were run on full-size equipment in the supplier’s test laboratory. “This provided data on attributes such as density and flow characteristics in order to establish design parameters, including different angles for running the flexible screw conveyors and product feed rates,” Millen said.

Flexicon Corporation (Aust) Pty Ltd
www.flexicon.com.au
Creating a splash: 3D printing of milk-based products

From pizzas and chocolate to purées for the elderly, the potential applications for 3D printing in the food and beverage industry are growing. In order for these products to gain further acceptance and wider applications, they must also be tasty and nutritious.

Researchers from the Singapore University of Technology and Design (SUTD) have now developed a method to perform direct ink writing (DIW) 3D printing of milk-based products at room temperature, while maintaining their temperature-sensitive nutrients. Their study has been published in the journal RSC Advances.

3D printing of food has been achieved by different printing methods, including the widely used selective laser sintering (SLS) and hot-melt extrusion methods. However, these methods are not always compatible with temperature-sensitive nutrients found in certain types of food. For instance, milk is rich in both calcium and protein, but these nutrients are temperature sensitive, so milk is unsuitable for 3D printing using the aforementioned printing methods, which require high temperature. While cold extrusion is a viable alternative, it often requires rheology modifiers or additives to stabilise printed structures. Optimising these additives is a complex and judicious task.

To tackle these limitations, the research team from SUTD’s Soft Fluidics Lab changed the rheological properties of the printing ink and demonstrated DIW 3D printing of milk by cold extrusion with a single milk product — powdered milk. The team found that the concentration of milk powder allowed for the simple formulation of 3D-printable milk inks using water to control the rheology. Extensive characterisations of the formulated milk ink were also conducted to analyse the rheological properties and ensure optimal printability.

“This novel yet simple method can be used in formulating various nutritious foods, including those served to patients in hospitals for their special dietary needs,” said SUTD PhD candidate, Lee Cheng Pau, lead author of the study.

“Cold extrusion does not compromise heat-sensitive nutrients and yet offers vast potential in 3D printing of aesthetically pleasing, nutritionally controlled foods customised for individual requirements,” added Assistant Professor Michinao Hashimoto, principal investigator of the study.

Food-grade computer

Interworld Electronics has released the FABS-921AP food-grade stainless steel panel computer.

The FABS-921AP is housed in a fanless aluminium enclosure with a 304 or optional 316 grade stainless steel bezel that provides IP-66/IP69K front panel protection. Part of the FABS Series, the FABS-921AP has been optimised to meet the hygienic design requirements of DIN EN 1672-2 and DIN 42115, Part 2. These European standards establish high standards for the food and beverage processing equipment.

The FABS-921AP is powered by an Intel 6th/7th generation Core i processor with DDR4 memory. A full HD 21” 1920x1080 resolution LCD and 7H anti-scratch highly durable projected capacitive touch screen make it suitable for operator panel and HMI control applications. The standard 250 cd/m² or an optional 1000 cd/m² high brightness screen is available.

The FABS-921AP provides 2 x COM, 2 x GbE LAN ports, 2 x USB3.0 ports, and support for internal Mini-PCIe expansion modules. Communication and network options include 3G/4G, Wi-Fi/BT, GPS and RFID. The internal 2.5” SATA3 HDD is easy to access, allowing the operating system and data storage to be upgraded at any time.

The FABS-921AP supports DC 9~36 V power input and an operating temperature range of 0 to 50°C. Operating system support includes Windows 10/IoT.

The FABS-921AP is only 60 mm deep. Panel and VESA mounting make the FAB Series convenient to install.

Interworld Electronics and Computer Industries
www.ieci.com.au
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**Flavour developed by artificial intelligence**

International perfume and taste company Firmenich has developed what is claimed to be the “first ever” flavour made by artificial intelligence.

The lightly grilled beef taste, which will be used in plant-based meat alternatives, is a key milestone in Firmenich’s digital transformation across its value chain.

Firmenich’s Chief Digital and Information Officer Eric Saracchi said the company is marrying the most fundamental elements of our DNA — innovation and creativity.

“AI enables us to explore new boundaries by empowering our creators with a precise formula starting point, as well as additional selections for optimised ingredient combinations from which they can create bespoke tastes,” Saracchi said.

The AI flavour was created in collaboration with Microsoft leveraging the entirety of Firmenich’s raw material base.

Firmenich Flavours President Emmanuel Butstraen said COVID-19 has changed the food innovation landscape as well as the consumer marketplace.

“We must understand and evolve to these rapidly evolving [changes] with more creativity at an even faster pace,” Butstraen said.

“The exciting addition of AI allows us to leverage different raw materials and explore new creative leads.”

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**IBC mixers with powder/liquid additions port**

The continuing rise of IBC (or TOTEs as they are sometimes known) as a means to transport, blend and ship liquid products led to the introduction of the Mixquip IBC mixer a number of years ago.

Further innovations with the Australian designed and manufactured mixers included EXD Flameproof motors and geared air drive motors to mix virtually any products that can be shipped in IBCs.

The 2020 Mixquip Series 200 IBC mixer has now made a significant advance in user-friendliness with an optional additions port.

This stainless steel funnel can now be optioned on any Series 200 IBC Mixer and bolts to the stainless steel bridge of the mixer.

The IBC additions port allows powders or liquids to be added directly into the mixing vortex within the IBC. There is no need to forklift the bridge-mount mixer off the IBC to access the opening, nor cut extra holes in the plastic top of the IBC. Ingredients can be mixed in quickly and effectively, without any mess or spills.

Teralba Industries

www.teralba.com

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**Tray positioning system**

Proseal’s tray positioning system calculates the required tray-spacing set-up parameters for individual tray sealing tool-sets, eliminating the trial and error usually associated with this process.

The ProPosition feature automatically identifies the best position for trays to ensure the perfect alignment every time.

It provides food manufacturers and processors with a one-step tool set-up removing the time-consuming and potentially wasteful process of running test trays through the tray sealer to ascertain the best position. Instead, operators are guided through the set-up via animated instructions on the machine’s touch screen.

The system then permanently saves the relevant parameters for each tool, which significantly speeds up product changeovers and avoids operator errors during set-up.

ProPosition is fitted as standard to all new Proseal GT platform machines. Additionally, as part of Proseal’s ongoing strategy of futureproofing its equipment, the software can be retrofitted to any pre-existing machines which have the suffix GTe and GTs.

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**Thermal flow meter**

AST thermal flow meters can be used by those responsible for the extraction, processing, storage, industrial plant distribution, consumption or sub-metering of natural gas.

Manufactured by Fluid Components International (FCI), the FCI Model ST80 Series and the Model ST100 Series thermal flow meters incorporate an Adaptive Sensor Technology (AST).

The technology uses a flow meter hybrid sensor drive, which combines constant power (CP) and constant temperature (CT) thermal dispersion sensing technologies in one flow meter.

AST thermal flow meters measure in CT mode during start-up and through the lower flow ranges and seamlessly shift into CP mode at mid-range and higher flow rates.

They also have a no-moving-parts thermal flow element design, which provides direct mass flow measurement of air and gases with a single process penetration.

FCI claims its Model ST80 Series and the Model ST100 Series are responsive (within 1 s) and accurate to ±0.75% of reading, ±0.5% of full scale, with repeatability of ±0.5% of reading.

They are suitable for use in air/gas temperatures up to 450°C.

Their wide flow range, from 0.08 to 300 NMPS, and array of analog outputs and digital bus communications allow their application in almost any industrial process or manufacturing application.

These models also come with global HazEx certifications for Div.1/Zone 1 level safety.

**AMS Instrumentation & Calibration Pty Ltd**
www.ams-ic.com.au

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**Danone launches Two Good yoghurt in Australia**

With the increasing demand for low-sugar options without artificial flavours, preservatives or colours, Danone has introduced a low-sugar yoghurt called Two Good to the Australian market.

The range has been developed using a special product process to remove sugar from milk. This process leaves each yoghurt cup with only 2 grams of naturally occurring sugar, which is claimed to be 70% less sugar than the average yoghurt.

With 0 g added sugar, 0 g artificial sweeteners, 0 g preservatives, 2 g of total natural sugar and fat, and 11 g of protein, each yoghurt cup is around 75–76 calories, depending on the flavour.

Danone’s Head of Marketing and Research & Innovation, Blanca Carbonell, said, “Millennials and Gen-Z are moving towards a simple balanced approach to food over fad diets, seeking nutritious foods that benefit their wellbeing. Our aim is to empower consumers to sustain a balanced simple lifestyle without having to compromise on taste. Thanks to our new innovative milk processing, we are bringing to consumers a unique yoghurt with low sugar, no nasties and still delivering on great taste.”

Now available from Coles supermarkets, the yoghurt’s flavour range includes: Mixed Berry, Vanilla, Salted Caramel, Mango, Peach and Cherry.

**AMS Instrumentation & Calibration Pty Ltd**
www.ams-ic.com.au

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**Carton former platform**

Syntegon Technology’s Kliklok ACE (Advanced Carton Erector) carton former platform is built with a focus on ergonomic design, sustainability and efficiency, with the integrated ‘Flex Feeder’ ensuring safe carton control throughout the entire process.

The range runs at up to 80 cycles/min with single, double or triple head and is suitable for a number of food applications, such as bakery, snacks, cereal bars, frozen/prepared food, tea and coffee, as well as non-food products.

The system can form lock-style and glue-style cartons on the same machine, and ultrasonic technology can also be provided.

Both the lock and ultrasonic versions are glue-free, making them a sustainable option.

The range can handle different carton format sizes, ranging from a blank size of 190 x 122 mm to 800 x 600 mm.

The carton hopper, which operators load manually, was designed at waist height. This makes the feeding process operator-friendly. The machine allows tool-less changeovers, which supports vertical start-up. The machine is built in an open-frame, stainless steel design, which is IP54 rated.

**Syntegon Technology Singapore Pte. Ltd**
www.syntegon.com
The VP600 features

- Fast print speed up to 8 inches per second. That is to say, you get **1,600 4" x 3" labels within 10 minutes**.
- Print one to 10,000 labels anytime on-demand. In other words, VP600 is suitable for **short run label printing**.
- High resolution up to 1,600 x 1,600 dpi. This is great for crisp text, fine barcode. Moreover, you get **brilliant colors for prime labels**!
- Compact size. This makes VP600 the perfect desktop **small color label printer for tight spaces**.
- Individual 200 ml ink tanks to **reduce replacement cost**. You get more labels between ink change and fewer user intervention than many entry level printers.
Orbital cleaner

The GEA OC200 Orbital Cleaner can be used in a wide variety of sectors, from food, beverage and wine, as well as healthcare to fish farming and marine, and chemical industries.

The orbital cleaner is specifically engineered for use in large process tanks and storage vessels where clean-in-place (CIP) processes are required. Offering a modular system, it uses a main cleaner assembly with interchangeable rotors, nozzle carriers and nozzles. It is suitable for use in tanks up to 35 m diameter requiring a 360-degree spray pattern.

The cleaner has a choice of three nozzle carrier options — 2, 3 or 4 nozzles — which fit onto the standard central core of the cleaner assembly. There is also the option of seven different nozzle diameters ranging from 9–15 mm and three nozzle lengths — long, short and extended.

The whole system is designed to be easy to interchange and adapt to the cleaning task at hand ensuring impact values, cleaning diameter and dwell time are optimised and efficient.

The cleaner has a flow rate of 317–1093 L/min with a pressure range of 4–10 bar. It’s suitable for use with water temperatures up to 95°C and has a full spray pattern time of 8–21 min.

The main cleaner assembly uses a locking mechanism to provide fast and easy disassembly for maintenance. Each nozzle includes self-cleaning jets to prevent product build-up to extend service intervals. The modular nozzle design also means it’s easy to replace worn nozzles when eventually required.

In Australia, the OC200 Orbital Cleaner assembly, components and service kits are available from Tecpro Australia.

Tecpro Australia
www.tecpro.com.au
**Air knife**

The compact Super Air Knife provides a uniform, high-volume, high-velocity sheet of laminar airflow across the entire length that is adjustable from a gentle blowing force to a hard-hitting blast of air. The energy-efficient design minimises compressed air use by entraining 40 parts room air to one part compressed air, offering a more efficient way to blowoff, clean, dry or cool parts, webs or conveyors.

The best way to cut energy costs is through proper maintenance and use of the compressed air system, with the most important factor to dramatically boost efficiency being proper use.

The Super Air Knife uses only one-third of the compressed air of typical blowoffs used in cleaning, cooling and drying operations. It can be instantly cycled on and off, further reducing compressed air usage and costs.

Even at high pressures of 80 psig (5.5 bar), the sound level is surprisingly quiet at 69 dBA for most applications. The Super Air Knife is CE compliant and meets WorkSafe Australia and OSHA dead-end pressure and noise requirements.

EXAIR Super Air Knives are available in many lengths from 3” (76 mm) up to 108" (2743 mm), in a variety of materials that include aluminium, type 303 stainless steel, type 316 stainless steel and PVDF plastic.

Applications include part drying after wash, sheet cleaning in strip mills, conveyor cleaning, drying food products, cooling hot materials and parts, web drying or cleaning, environmental separation, pre-paint blowoff, bag opening/filling operations and scrap removal on converting operations.

*Compressed Air Australia Pty Ltd
www.caasafety.com.au*
Reducing waste in meat processing

Chris Little, Director, HRS Process Solutions

The recent Australian Government announcement seeking a partner to help establish a National Food Waste Governance Entity is good news for both the country and the planet. However, given the climate emergency, there is no reason for proactive food producers to wait before they take action to reduce waste from their own manufacturing processes. In doing so, not only will they do their bit for the environment, but they will also improve their own financial bottom line.

According to the government, 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. Of course, there is an economic cost to this waste as well as an environmental one — not only in terms of lost revenue from potential product sales, but also in terms of disposal costs.

Using equipment which has been specifically designed to minimise losses during processing, together with the use of dedicated systems to clean and recover product from equipment after processing, can go a long way in terms of reducing processing losses, particularly those associated with product changeovers, cleaning, etc.

In the most demanding situations, scraped surface heat exchangers are specified as the scrapers continually remove residues from the surface of the tubes before they build up. These heat exchangers can be used for numerous processes, including heating and cooling, cooking, concentrating, pasteurising and sterilising.

However, no matter how much build-up of product you avoid 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 this problem has been overcome by the use of ‘pigging systems’ to physically push product through key parts of the system or to use water or air to push product through, although all have certain disadvantages, including added complexity and the potential to dilute or contaminate products.

A better option is to use a heat exchanger, such as the HRS R Series, which can be run in product recovery mode before the cleaning cycle commences. This range of scraped surface 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. In certain configurations with less viscous materials, this screw can be run in reverse, effectively emptying the heat exchanger tubes of product 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 losses 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.

The R Series can be configured for both horizontal and vertical operation, 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 R Series heat exchanger can quickly pay for itself and in the long term can be a more economical option than alternative systems which have lower capital costs.

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Scottish ice cream manufacturer Mackie’s installs an ammonia-based, low-carbon and energy-efficient cooling system with an absorption chiller from GEA.

The existing freezing plant at Mackie’s Aberdeenshire plant will be replaced with this new system, which combines biomass heating and absorption cooling.

Mackie’s currently produces over 10 million litres of ice cream per year and has environmental plans of achieving CO2 reductions of 90% and energy cost savings of 70 to 80%.

Over the years, the manufacturer has invested in renewable energy, including four wind turbines and a solar farm in Scotland. Its latest green initiative involves replacing the gases used in its refrigeration systems from ‘partially halogenated’ chlorofluorocarbons (HCFCs), which have a high global warming potential, with ammonia.

Ammonia is claimed to be a natural, environmentally friendly refrigerant that has no impact on global warming or ozone depletion.

Scott White, GEA’s Sales Manager, said his company has a wealth of experience in designing and installing systems based on and using this ammonia technology. As Mackie’s had no experience with this refrigerant, he said GEA provided assistance with all the process and regulatory issues that needed to be addressed.

The GEA equipment order is said to be worth around 4.5 million British pounds (AUS8.1 million).

**Single tank processing system**

JBT Corporation’s READYGo LIQUIFUSION Tanks are designed to combine blending, dispersion, emulsification, heating and cooling operations, which are typically spread across a range of different machinery. The single tank processing solution is designed to lower capital cost and carbon footprint, with reduced material handling and product transfer.

The tanks are available in six standard volumes and can be customised to handle a broad range of products and processes. This includes four separate agitator options that can be combined to create mixing for a variety of applications and can handle viscosities up to 100,000+ cP.

The optional ASME dimple jacket provides heating and cooling compatible with a variety of heat transfer media.

The system has been used for products such as gums, flours, cocoa, yeast, powdered egg, caseinates, condiments, juices, purees, whey, slurries and cheese.

The system also offers low-level mixing, reduced batch time, elimination of agglomerated powders, a more homogenous blend and increased batch uniformity.

A range of optional instrumentation can be included to further reduce manual processing.

**Digital multifunctional load management system**

TeSys island is a digital multifunctional load management system that can switch, protect and manage motors and other electrical loads of up to 80 A.

The Schneider Electric product helps prevent unplanned stoppage and enables the early detection of abnormal load behaviour. By automating routine tasks, leveraging simulation technologies and having a design that reduces wiring and enables faster mounting to din rail, TeSys island is designed to reduce time to market by up to 30%.

With this smart load management system, commissioning and operation is also made easy. TeSys island can seamlessly integrate machines to IT using open standards and allows users to commission remotely.

To reduce machine downtime, TeSys island enhances maintenance efficiency with faster information tracking. By using TeSys island, it can help users generate up to 50% time saving on corrective actions.

The product can be used in pumping, packaging, conveying and other industrial and commercial applications and is compatible with third-party PLCs and all industrial field buses.

**JBT FoodTech**
www.jbtfoodtech.com

**Schneider Electric**
www.se.com/au/en
Modular carrier board

Acromag’s ACEX4041 Express Type 10 carrier board interfaces four I/O module slots to an Intel Atom COM Express CPU module on a Mini-ITX format for a variety of data acquisition and control applications.

Designed for use in systems with size, weight, power and cost restrictions (SWaP-C), this carrier card provides a solution for a broad range of signal processing tasks. The COM Express site supports high-performance, low-power Intel Atom CPU modules. The four I/O slots interface Acromag’s rugged AcroPack modules or Mini PCIe cards enabling a mix of measurement, control and communication capabilities. An M.2 slot offers onboard storage while a SATA connector provides additional data storage options.

Ports for two RJ45 Gigabit Ethernet, two USB 3.0, two RS232, one Mini-DisplayPort and audio connections are also included.

The ACEX4040 carrier card can be used to combine a COM Express Type 10 CPU module with a mix of I/O modules for custom computing applications. With its rugged design and compact Mini-ITX form factor, this carrier card is easily mounted in a variety of enclosures for rapid development. High-density I/O connectors and numerous ports simplify interface to field devices and peripherals.

Metromatics Pty Ltd

www.metromatics.com.au
App to monitor dry claw vacuum pumps in real time

Atlas Copco has developed an app that allows vacuum pumps to be controlled and monitored in real time from a smartphone. The first models in which the app is used are the DZS 100 VSD+, DZS 200 VSD+ and DZS 400 VSD+ series of claw vacuum pumps, and the oil-injected rotary vane pump GVS A VSD+. The app requires iOS 8.0 and Android 4.03 for operation, and can be downloaded from the App or Play Store.

The comfort functions of the app are user-friendly and enable efficient operation. The coarse vacuum pumps of the DZS series feature a VSD+ drive on the motor. The Atlas Copco VSD+ app allows the fixed speed DZS claw pump to be operated as a speed-controlled pump. The pump’s performance can be adjusted to its process requirements, avoiding excessive vacuum generation. As a result, the app individually adjusts power consumption and increases overall productivity.

The operating functions are user-friendly, as the app can be connected automatically via an integrated Bluetooth interface once the pump is started. The pump can be used after entering the desired parameters into the smartphone. The performance data and settings can be seen in real time, with parameters such as inlet pressure, rotor speed, operating hours and maintenance intervals monitored and adjusted if necessary.

Users can select a language by clicking on the respective flag symbol, and select their desired units, such as differential current, pressure and temperature measurements. Current actual values are displayed in two separate menus: input and output data as well as the process variables. Atlas Copco plans to make the app available for other vacuum pump models in future.

Atlas Copco Compressors Australia
www.atlascopco.com.au

Extrusion machines

Engineering company GEA has updated its range of extrusion machines.

The GEA Round Die-Washer, GEA Universal Die-Washer and the GEA Universal Mini Die-Washer all are constructed of stainless steel, including the sturdy frames.

The machines clean the die by removing any dough residue that gathers on the surfaces during production, thanks to a washing arms movement system.

The machines are available in two types: Type M, which is equipped with an intuitive control panel allowing easy access to the basic control functions; and type E, which is equipped with PLC and features the washing area management system, enabling the operator to program as well as customise washing phases and modes, thus optimising the execution time.

All models can accommodate one or more dies for pasta, snacks or pellets.

The water tank in each die washing machine is based on a closed loop system, allowing the water to be recirculated after filtering. The triple filter system means the process water can be re-used longer, resulting in a quicker washing cycle, while requiring less water and energy, therefore extending the lifecycle of the pump. During the washing phase, the foam removal system with temporised water jets prevents the formation of foam, which ensures a more efficient washing process.

GEA Group
www.geagroup.com.au
Low-energy beverage processing line

Tetra Pak has launched a low-energy processing line for juice, nectar and still drinks (JNSD) to improve the efficiency of beverage processing. It uses a combination of pasteurisation, filtration and UV light technology to treat beverages in two separate streams, which are aseptically blended together into the final beverage.

Instead of pasteurising the whole volume of the product, the production line separates out water and pasteurises only the concentrate. Water is treated separately with filtration and UV light, which requires less energy. Users of the JNSD processing line can reduce energy consumption by up to 67% and water consumption used for cleaning-in-place and sterilisation, and product changeover can be cut by up to 50%.

Tetra Pak Marketing Pty Ltd
www.tetrapak.com.au

Digital flow controller and meter

The Dwyer Instruments Series DFC Digital Flow Controller combines a straight tube sensor with a restrictor flow element, designed to provide accurate readings and control. Simultaneous displays of mass flow, volumetric flow, pressure and temperature parameters promote applications in a variety of industries.

The Series DFM Digital Flow Meter is used for the measurement of mass and volumetric flow rates of process gases. Using the OLED/Joystick interface, the flowmeter can measure up to 30 different gases. Simultaneous displays of mass flow, volumetric flow, pressure and temperature parameters promote applications in a variety of industries.

Dwyer Instruments (Aust) Pty Ltd
www.dwyer-inst.com.au
A novel use of evaporation using heat exchanger technology from HRS Heat Exchangers has increased drying capacity for a major European processor of cheese products.

The client takes out-of-specification cheese products from production sites across Europe and converts them into high-quality protein for use in pet food and animal feed. The cheese is pasteurised and then dried to produce a powdered additive.

When the client wanted to increase production capacity, its first thought was to install an additional dryer; an expensive and energy-intensive solution. However, as the capacity of the dryer is determined by the amount of water it can remove per hour, another way to increase overall throughput would be to reduce the water content of the cheese products before drying, so that a larger volume could be dried at one time.

The client approached HRS because of its established expertise in evaporation and concentration technology. The first step was to determine if the existing dryer would cope with a more concentrated cheese solution. HRS supplied a trial evaporation system which the client used to analyse all aspects of the revised production system, the properties of the materials and the potential results. The trial unit proved that the concept was feasible, and so HRS designed an appropriate evaporation system to sit between the existing pasteuriser and dryer.

The trials and material analyses also showed how the physical and thermal properties of the cheese change as it is heated, and the water is removed. At the beginning of the process, the product is fairly liquid with good thermal transfer characteristics, but as water is removed it becomes more solid and concentrated, with less heat transfer. To
provide adequate processing, a continuous treatment process would have to be designed around the ‘worst case’ thermal characteristics at the end of the process.

It was therefore decided to adopt a batch treatment approach as overall this required a smaller heat transfer surface, less equipment, and less energy, requiring a smaller evaporator, smaller ancillaries, and less energy to run. The batch system, which employs two tanks — one of which is filled while the other is being treated — is also simpler to design and operate. Employing a two-tank system with full automation also results in a continuous operational process.

Heated cheese is a high-fouling, extremely viscous, material. Therefore, an evaporator based on the HRS Unicus Series of reciprocating scraped surface heat exchangers was supplied to prevent the build-up of cheese and burnt-on cheese residue on the tube walls of the heat exchanger. To reduce energy requirements and improve operational efficiency, the evaporator operates at a vacuum of around 200 mbar, meaning that the water in the cheese solution boils off at 60°C.

HRS supplied two complete skid-mounted systems, each of which comprised the Unicus evaporator, two tanks, pumps, controls, and connections. Each skid-mounted system can process 3.6 tonnes of cheese product per hour, increasing the total solid concentration from 34 to 45%, and increasing dryer capacity by a similar amount.

More generally, the HRS Unicus Series is widely used in dairy processing and is suitable for products such as soft cheese, creams, curds, etc. The Unicus Series has been specifically designed to provide unrivalled heat transfer with a wide range of difficult dairy products which have high fouling potential (which would limit heat transfer), but which at the same time need delicate handling to preserve fragile product integrity. A process of continual improvement means that Unicus heat exchangers are available with a wide range of scraper types, providing even more choice for applications from food pasteurisation to curd processing.

The Unicus Series, which is ideal for hygienic applications, is based on traditional shell and tube heat exchangers, with the addition of a patented stainless steel scraping mechanism which is hydraulically moved back and forth within each interior tube. This movement performs two key functions. Firstly, it minimises potential fouling of the product by keeping the tube wall clean. Secondly, the movement creates turbulence within the material. Both actions help to increase heat transfer rates and together, they create a highly efficient heat transfer process ideal for viscous and high fouling materials.

Designed for hygienic food industry applications, the R Series from HRS Heat Exchangers uses a rotary scraper rod which can reach velocities of 300 rpm, providing high levels of shear and mixing at the heat transfer surface which dramatically increases heat transfer rates. This makes it particularly suitable for challenging heat transfer applications, such as those where the product has the potential to crystallise during processing or where aeration is required.

The scraper rod features both a helical mixing spiral (which reduces the pressure drop in the tube) and a series of scraper blades. Together these provide a continuous scraping action which mixes highly viscous products and reduces fouling. The unique design enables high viscosity products to be pumped with reduced back pressure and lower energy use, in a compact unit which features a much smaller footprint than traditional heat exchangers for similar applications.

A unique gearbox design not only reduces noise, but also allows multiple tubes to be fitted inside a single shell from a single electrical drive, further increasing the available heat transfer area within the same shell footprint and aiding maintenance. Cleaning and maintenance are further improved by the unique sealing system used in the R Series which allows individual tubes to be removed for easy servicing and replacement if necessary.

Thanks to its helical spiral, in many applications the R Series can also be run in reverse, enabling much valuable product to be recovered before routine cleaning-in-place or product change-over without the need for additional pigging or flushing systems. Not only does this reduce costs and complexity, but saving product adds dollars to the bottom line.

About HRS Heat Exchangers
Located in Melbourne, HRS Heat Exchangers is part of the HRS Group which operates at the forefront of thermal technology, offering innovative heat transfer solutions worldwide across a diverse range of industries. With almost 40 years’ experience in the food and drink sector, specialising in the design and manufacture of an extensive range of turnkey systems and components, incorporating our corrugated tubular and scraped surface heat exchanger technology, HRS units are compliant with global design and industry standards. HRS has a network of offices throughout the world: Australia, New Zealand, UK, Spain, USA, Malaysia and India; with manufacturing plants in the UK, India and Spain.
CBS is a specialist supplier of innovative products from around the world. We strive to supply only the highest quality products to our customers ensuring the backup services to maintain the level of quality through the supply chain.

Our aim is to be your partner and understand your business, so together we can meet the ever growing challenge within the food processing business.

Our in depth knowledge of the food processing environment gives us the edge and is our real point of difference. Starting with processing techniques, through raw material/ingredients, machinery selection/installation, project management, product development, implementation and training.

Our core strength is within the meat processing industry - red meat, small goods and poultry, as well as the convenience foods, ready meals, fish and cheese industries.

MAJA derinding, defatting, membrane skinning, flake ice machines
ASTECH automatic bandsaw, portion cutting
KOLBE bandsaw, mixing/grinding, grinding
TREF slicing, dicing, portion cutting
SCHRÖDER injecting, brine mixing, massaging
REX vacuum filling, auto linkers, mince lines, forming attachments
STEPHAN cutting, mixing, emulsifying
LORENZO BARROSO clippers
VAKONA vacuum, massaging, tumbling, mixing, marinating
REICH smoke houses, ovens, fermentation rooms, water cookers
BOSS vacuum packing, dip tanks, auto packing lines

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From a long black to a flat white and everything in between, whatever your coffee preference may be, the majority of us will enjoy a coffee or two every day.

Since 1952, Suntory Coffee has been producing some of New Zealand’s most well-known coffee brands, such as Robert Harris, Orb Espresso & Bruno Rossi Coffee.

At the head office in Auckland, Suntory Coffee’s new purpose-built coffee roasting and warehousing operation is where many of the brands are processed ready for despatch to cafes, restaurants and supermarkets across New Zealand.

When Cameron Russell, Project Engineer at Suntory Coffee, began planning the facility, the selection of equipment was an important detail. From coffee bean roasting to powering control valves that select the required coffee bean silo, right through to grinding, blending, processing and packaging — compressed air is an essential utility that would be required for many purposes within the new facility.

After considering a number of options, Suntory Coffee opted for an all-in-one Kaeser Aircenter SK25 compressed air station along with filtration and a DHS 4.0 air-mains charging system to meet these requirements.

Manufactured in Germany, the user-friendly turnkey system incorporates a Kaeser rotary screw compressor, complete with the Sigma Profile screw compressor block — an energy-efficient refrigeration dryer and an air receiver all-in-one space-saving compact package.

At the heart of the Aircenter’s rotary screw compressor lies a screw compressor block featuring the Kaeser Sigma profile rotors. Efficiency is assured with these flow-optimised rotors that are claimed to be able to achieve power savings of up to 15% compared with conventional screw compressor block rotor profiles. In addition, maximum energy savings and good system performance are assured thanks to the inclusion of an IE3 motor which complies with and exceeds prevailing Australian GEMS regulations for three-phase electric motors.

The Aircenter is user- and maintenance-friendly, and with the internal Sigma Control 2 controller, compressor performance can be easily controlled and monitored for efficiency. All maintenance and service points are easy to...
access, which reduces the downtime associated with service and maintenance tasks and helps to increase compressed air availability and minimise operating costs.

**Food-grade standard compressed air**

As the coffee can come into contact with the compressed air at certain stages of production, it was essential that the compressed air system produced food-grade standard compressed air. To meet the air purity level required for food manufacture, the Aircenter at Suntory Coffee therefore operates with a food-grade lubricant and filtration. In addition, a Kaeser DHS 4.0 air-main charging system was installed.

The DHS 4.0 series electronic air-main charging system not only provides protection for the compressed air treatment components, but it also helps ensure reliable compressed air quality — even following a complete shutdown of the compressed air supply system, for example at weekends. Such a surge can lead to filter element damage and to a raised pressure dewpoint in the refrigeration dryer. As a result, contaminants such as oil, particulate matter and humidity are introduced into the pipe distribution network and the process air. The DHS 4.0 eliminates these risks by guaranteeing necessary minimum pressure, which consequently ensures smooth network start-up and safe operation of the compressed air station.

During system operation, it also helps to ensure consistently high compressed air quality. If a fault were to occur with a dryer or a filter, for example, the DHS 4.0 is able to shut down and isolate the affected treatment line. This not only assures consistent air quality, but also safeguards the pipe distribution network and the air consumers in the production facility. By minimising the burden on compressed air treatment components, air receivers and pipe networks, and preventing surge loads caused by large changes in pressure from occurring, it consequently enables longer service life, which in turn leads to considerably reduced costs.

The new facility has now been in operation for over 18 months.

*Kaeser Compressors Australia*
*au.kaeser.com*
Light curtains

The Allen-Bradley GuardShield Light Curtains include the CIP Safety over Ethernet module along with integrated laser alignment, muting, blanking and cascading.

Light curtains are an essential safety mechanism in a manufacturing plant, particularly those requiring cutting and chopping before packaging a final product. Staff need access to the product without having to regularly open and close guarding, which is where GuardShield Safety Light Curtains are designed to help with their innovative design to ensure the safety of personnel. The design also helps to reduce maintenance and spare parts.

The integrated CIP safety over EtherNet modules provide detailed diagnostics and status information to Logix DLR networks to cascade to multiple 450L or other EtherNet/IP products together.

Most light curtains on the market contain a transmitter and receiver stick, but the GuardShield curtain leverages patented plug-in transceiver technology. Each stick can be used as either a transmitter or receiver via innovative plug-in modules, resulting in fewer parts being required.

To significantly reduce engineering effort, the GuardShield range was designed with embedded functions that are configured quickly and easily via DIP switches or software, including muting, blanking, start mode, external device monitoring and scanning ranges.

The range also features an Integrated Laser Alignment System (ILAS), designed for quick installation and reliable operation, which reduces alignment labour time. This can amount to cost savings when installing 450 L units across multiple locations, and improved up-time regarding maintenance and hardware-replacement efforts.

The units come in different lengths ranging from 150 to 1950 mm — in multiples of 150 mm in both 30 mm hand and 14 mm finger resolutions. There are no dead spots (passive zones) at the top or bottom of the stick, which means they can be installed inside a machine frame and do not have to be mounted outside or on the machine like a traditional light curtain system.

NHP Electrical Engineering Products Pty Ltd

www.nhp.com.au
How did that get there?
Detecting foreign objects in food

Product recalls of food items can not only damage companies financially, they can also result in a loss of consumer confidence. Manufacturers therefore have a keen interest in inspecting their products for foreign objects.

While X-ray machines can easily identify metals, they can often have difficulty with detecting plastics, wood and glass. This means that, despite inspections, there is still a certain residual risk for manufacturers.

A prototype radar technology developed at the Fraunhofer Institute for High Frequency Physics and Radar Techniques FHR called SAMMI can now be used to complement X-ray machines in order to provide greater security in food production.

“Our system is based on millimeter waves and can augment established X-ray techniques,” said Daniel Behrendt, business unit spokesperson at Fraunhofer FHR. “It detects the foreign matter that X-ray techniques can easily overlook — that is, glass splinters, plastics and wood. However, it is not able to penetrate metals, which in return is detected by X-ray techniques.”

Another advantage of the technology is that the millimeter waves used to inspect the foods pose no health risk.

How does it work?
The inspection works as follows: the food is placed on a conveyor belt and transported through the machine. Above the conveyor, the transmitting antenna rotates and transmits its waves through the product; below it, the receiving antenna receives these waves. The millimeter waves are uniquely attenuated by each of the different food materials and undergo a specific delay in their transit time. This makes it possible to identify not only the structure and composition of the food, but also the slightest deviations from those — such as are caused by foreign objects, for instance.

Assigning a pixel to each measurement point and encoding the changes with different colours produces an image of the investigated object on which the foreign matter is immediately evident. Even packaged goods can be inspected in this way, non-destructively and without physical contact.

The prototype the researchers have set up at Fraunhofer FHR measures 40 x 40 x 30 centimetres and can be used to analyse foods measuring up to 30 x 30 x 5 centimetres. “But from a purely technological standpoint, there is no limit here,” Behrendt said.

Feasibility study on sandwich cookies
Initial feasibility studies have already been completed. The researchers used SAMMI to inspect sandwich cookies in which they had previously placed a glass splinter in the chocolate filling.

Their efforts met with success: the prototype reliably detected the foreign objects.

The technology also performed well when inspecting an advent calendar: the radar image showed clearly that three pieces of chocolate were missing, but that all others were present and correctly positioned.

In an additional step, the research team now wants to further improve the inspection speed and the precision.

Other applications
Food inspection is just one application for which this technology is suitable. The system offers advantages, for instance, in non-destructive product testing: in an advent calendar inspection, it shows, for example, whether the adhesive dots were applied with sufficient thickness to hold the calendar together. Hübner Photonics is already marketing this system for the inspection of letters and small packages, calling it T-SENSE.
A tubular heat exchanger has obtained EHEDG certification, meeting Europe’s leading food safety standards.

Multinational food packaging and processing company Tetra Pak initiated component testing with EHEDG on its Tubular Heat Exchanger equipment in 2018.

Subsequent tests were completed in 2019, and by 2020 the Tetra Pak Tubular Heat Exchanger received the EHEDG certification.

Tubular heat exchangers are used to heat and cool liquid food, enabling them to be safe for consumption. The heat exchanger is one of the most critical components in a processing line as it is the hottest part during heat treatment and where fouling is most likely to occur.

Therefore, innovation advances in hygienic engineering and design are key to meet increasing food safety demands consistently.

EHEDG promotes safe food by improving hygienic engineering and design in all aspects of food manufacturing.

Following the initial tests, the company made modifications to develop a new seal with a super-hygienic design and shape, which uses material approved according to US FDA and EU harmonised rules.

Tubular Heat Exchangers are used to process liquid dairy products, beverages and infant formula, as well as many other food applications.

Tetra Pak Marketing Pty Ltd
www.tetrapak.com/au
Food-grade industrial coating

A.W. Chesterton Company has added the ARC MX FG food-grade coating to its range of ARC Industrial Coatings. The coating is designed to protect machinery and tanks exposed to wet and dry fine particle/abrasive slurries in food processing and other industrial applications.

ARC MX FG is a two-part, 100% solids, no-VOC system suitable for equipment involved in direct food contact such as chutes and hoppers, mixers and agitators, transport screws/augers and pumps. It can also be used in a wide range of other industries, including mining and ore processing, wastewater, specialty chemical, and pulp and paper.

The coating is a trowel-applied ceramic-reinforced epoxy that provides protection over rubber linings and ceramic tile for fine particle wear.

The product complies to 21 CFR 175.300 for Condition C and less severe exposures for: Type II – Acidic (pH 5.0 or below), aqueous products; may contain salt or sugar or both, including oil-in-water emulsions of low or high-fat content food; Type III – Aqueous, acid or non-acid products containing free oil or fat; may contain salt, and including water-in-oil emulsions of low or high-fat content; Type IVA – Dairy products and modifications: Water in oil emulsion, high or low fat; Type IVB – Dairy products and modifications: Oil in water emulsion, high or low fat; Type V – Low moisture fats and oils, Condition C; and Type VIII – Dry solid foods.

Modular industrial display screens

Emerson’s RXi Modular displays deliver high performance in harsh operating environments. The range of RXi industrial display and panel PC products allow users to monitor, visualise and enhance production processes in life sciences, metals and mining, power and water, and manufacturing and machinery. The modular design allows users to select the right configuration based on application needs and minimises lifecycle costs through flexibility, serviceability and field upgradeability. The displays are designed to work with Emerson’s programmable logic control (PLC) programmable automation control (PAC) solutions and third-party control systems.

The range features standardised physical designs to minimise the variety of enclosure cut-outs required for OEM applications, making each display replaceable and upgradeable in the field, with no need to modify existing or install new cabinets. The industrial displays provide the same experience, look and feel for consumers, regardless of size or application.

All models include multi-touch screens that can operate in temperatures from 20 to 65°C and optional sunlight-readable screens on select sizes. The range of displays is IP66-certified for protection against dust and jets of water.

Emerson Automation Solutions
www.emerson.com/au/automation

Scroll vacuum pump for food applications

Atlas Copco DSS oil-free scroll vacuum pump is suitable for food packaging and processing, and pharmaceutical and laboratory applications.

It is particularly suitable for vacuum generation in the rough vacuum range.

A key feature of the pump is its simple and effective operating principle for gas handling. Inside the pump, there are two intermeshing, spiral-shaped screws made of aluminium. One spiral screw is fixed, while the second one rotates to compress the gas inclusions.

The pump also has low energy consumption, lower lifecycle costs and user-friendly operation.

Due to its dry running, no oil changes are necessary, and there is no risk of contamination. There is also no need to replace the exhaust filters.

The pump will provide a stable vacuum at atmospheric pressure of up to 1 mbar and maximum productivity at low to medium flow rates.

Atlas Copco Compressors Australia
www.atlascopco.com.au
Cereal bar project

Healthier on-the-go cereal bars with 30% less sugar, the same sweet taste and more fibre are being developed by food scientists from the University of Reading.

A team from the Department of Food and Nutritional Sciences are working together with industrial partners — Strauss Group, DouxMatok, Herbstreith & Fox and Bühler — on a new cereal bar project through the EIT Food-funded SuReBar project.

The sugar in cereal bars comes predominantly in the binders that are used to hold the cereal components together. The binders may contain syrups such as glucose syrup or honey, sometimes in addition to sucrose. Therefore, the sugars have both a physical function as a binder as well as providing sweetness.

Dr Julia Rodriguez Garcia, the project leader of SuReBar and Lecturer of Food Science and Technology at the University of Reading, said: “The cereal bars are being designed with 30.6% less sugar content, no added high-intensity sweeteners and higher levels of fibre than the standard alternative.”

The development of SuReBar includes a mixture of inulin, dextrins and pectin fibres to achieve a similar texture as the full sugar cereal bars. It also includes incredo sugar, which is based on Douxmatok’s technology for efficient sucrose delivery to taste receptors, to achieve a similar sweetness as the full sugar cereal bar.

In particular, pectin fibres from Herbstreith & Fox have been used in combination with Legria—a newly developed ingredient from brewer’s spent barley grain which is high in fibre and protein.

The team behind SuReBar have run successful pilot plant trials and samples are now going to be analysed in terms of shelf life and consumer acceptability. The plan is to commercialise them by 2023.
Freedom Foods Group is an Australian-owned company with a portfolio of brands across cereals, snacks, dairy, plant-based and nutritional products that are distributed around the world.

As part of its commitment to sustainability, the company identified its Shepparton site in Victoria for the start of its solar and battery transition last year.

The 3.8 MW solar and 500 kW/1250 kWh battery project was designed, installed and commissioned by AEES Group, an end-to-end energy management company. AEES Group selected FIMER as one of its technology partners for the project.

Freedom Food Group’s Shepparton site is a high-voltage (HV) 22 kV site.

AEES Group designed the solution, so its solar generation is fed into three HV skids via FIMER’s 1500 V PVS-175 string inverters, which connect into the site’s HV transformers.

The company said the project was the first in Australia to employ FIMER’s largest string inverters.

The 3.8 MW solar project was built over three stages. When completed in February 2020, a total of 18 PVS-175 three-phase string inverters were installed and commissioned.

Richard Martin, Managing Director of AEES Group, said he was extremely impressed with the FIMER solution.

“FIMER’s PVS-175 was the ideal choice for delivering this landmark project,” he said.

“The flexibility and power specifications this inverter could deliver, coupled with FIMER’s technical know-how and experience, meant we were able to meet our customer’s expectations and deliver a superior and reliable solution.”

FIMER said its unique approach with the PVS-175 also offers 1500 VDC and 800 VAC. Due to the higher AC and DC voltage, the solution can provide cost savings, with increased return on investment. The solution is also plug and play, which enables faster installation to meet project timings.

The solar and battery solution will see 5.36 GWh produced annually, which equates to an emission reduction of approximately 5500 metric tonnes of CO₂ per year.

FIMER Australia
www.fimer.com

Vacuum pump control app
Atlas Copco has developed an app that allows vacuum pumps to be controlled and monitored in real time from a smartphone. Pumps can also be commissioned optionally by entering fewer setpoints. The app can be used with the claw vacuum pumps of the DZS 100, 200 and 400 VSD+ series, and the oil-injected rotary vane pump GVS A VSD+.

For users, the comfort functions provide greater user-friendliness and more efficient operation.

The coarse vacuum pumps of the DZS series with integrated inverter drive are equipped with a VSD+ drive on the motor. This includes various remote connection options, including the Atlas Copco VSD+ App. With the app, the fixed speed DZS claw pump can be operated as a speed-controlled pump. The performance of the pump can also be adjusted to the respective process requirements, so that excessive vacuum generation can be avoided. As a result, the app individually adjusts power consumption and ultimately increases productivity.

The app automatically connects via an integrated Bluetooth interface as soon as the pump is started. Once the desired parameters have been entered into the smartphone, the pump can be put into operation. Users can also visualise performance data and settings in real time. Relevant parameters such as inlet pressure, rotor speed, operating hours and maintenance intervals can be checked at any time and adjusted if necessary.

The Atlas Copco VSD+ app requires iOS 8.0 and Android 4.0.3 to be operated, and can be downloaded from the App or Play Store. Users can click on the respective flag symbol to select the desired units, such as differential pressure and temperature measurements. Atlas Copco plans to make the app available for other vacuum pump models.

Atlas Copco Compressors Australia
www.atlascopco.com.au

Tray sleever
Keymac’s K101 tray sleever has been developed specifically for the preformed tray market for the ready meal, snacks or protein industry.

The tray sleever has a fully automatic continuous motion tray sleever that places pre-glued sleeves around a variety (square, round, oval) of trays at speeds up to 60 trays/min.

It’s not only ready meals that are a part of Keymac’s Packaging Systems, the K101S Sleever provides plastic-free 100% recyclable packaging for fresh produce.

With 0% plastic, the unit can pack kiwis at 75 packs/min into a 100% recyclable cardboard pack. The mobile sleever can be changed over in 5 min by operators without the need for tools and can be moved from one line to the next.

Select Equip
www.selectequip.com.au
Flow meter

The ST75 air/gas flow meter from Fluid Components International measures fuel gas, process gas, inert gas, waste gases and air in small line sizes. With built-in temperature compensation, the flow meter maintains consistent performance in rugged, hot industrial process environments.

Suitable for use in food/beverages, chemical processing, electronics manufacturing, power generation, pharmaceuticals, metals and materials industries, the flow meter operates over a wide flow range, from 0.01 to 559 SCFM (0.01 to 950 NCMH) depending on line size. For variable process conditions, the ST75 is factory preset to a wide turndown range at 10:1 to 100:1.

It features accuracy to ±2% of reading with ±0.5% repeatability over varying process temperatures in line sizes from 6 to 51 mm. With a Vortab flow conditioner added as a spool piece, the models ST75V or ST75AV are suitable for installations with limited straight-run and/or for operating in transitional flow ranges with accuracy of ±1% reading, ±0.5% full scale.

The meter’s precision flow element has a no-moving parts design that employs platinum RTD sensors embedded in equal mass thermowells with microprocessor electronics calibrated to laboratory standards for a wide range of gases.

It features remote mounting capabilities for hazardous or crowded plant environments. The remote mount transmitter, which includes a full digital display, can be mounted up to 15 m away from its thermal mass flow sensor in the process piping and connected via two 0.50” FNPT or M conduit connections. ST75’s scalable dual 4–20 mA standard outputs are user assignable to flow rate and/or temperature and a 0–1 kHz pulse output of total flow. The instrument can be ordered for input power with either 18 to 36 VDC or 85 to 265 VAC, with or without a built-in LCD digital display.

AMS Instrumentation & Calibration Pty Ltd
www.ams-ic.com.au
Mono-material polypropylene lidding films
KM Packaging has launched a range of mono-polymer material lidding films made from polypropylene (PP) that is designed for recyclability.

The sustainable films seal and peel to PP and PE-lined PP trays and can be used during microwave cooking, as well as being suitable for ambient, chilled or frozen applications. Part of KM’s K Peel range, the films allow food manufacturers to meet the growing demand, particularly from supermarkets, for mono-material packaging that is designed for recycling.

The lidding films are suitable for the packaging of poultry, meat and chilled prepared foods. They also feature anti-fog capabilities and are available with or without a barrier.

KM Packaging Services Ltd
www.kmpackaging.com

End-of-line automation
LAN Handling’s high-capacity pick and place systems are suitable for meat, fish, poultry and fresh produce packs.

The centre of the L.H. end-of-line solution is its Crate erecting, Robotic crate loading & Robotic palletising system.

With a small footprint and the ability to easily be reconfigured/relocated as the user’s production changes, LAN’s palletising robots have the flexibility to adjust to the user’s needs, from simple layout with pallets on the floor, through to full palletising all kinds of objects from boxes, bales and sacks with efficient handling.

Crate loading uses robotics with a range of quick-change gripping heads that use vacuum or mechanical grippers depending on the product. Vacuum grippers are used for typical retail packaging, such as skin packaging, top sealed trays or flow wrapped. Mechanical grippers are used for pillow packs or netted bags for fresh food. Capacity is up to 160 trays/min and capable of working with a high-speed tray sealing system like G.Mondini.

LAN’s end-of-line automation is designed to improve production capacity; it decreases reliance on labour, reduces damage to fresh produce, improves food safety, reduces the risk of errors, improves the ergonomics in a production process and with its turnkey handling systems brings innovation, efficiency and predictability to a production environment.

Select Equip
www.selectequip.com.au

GIVE CONTAMINATION THE BOOT!
For more information:
Email: sales@fmcgis.com.au
Phone: 1300 628 104 or (02) 9540 2288
A solution for all budgets
The e-nose comprises a ‘barcode’ that changes colour over time in reaction to the gases produced by meat as it decays, as well as a barcode ‘reader’ in the form of a smartphone app powered by artificial intelligence (AI). The e-nose has been trained to recognise and predict meat freshness from a large library of barcode colours.

When tested on commercially packaged chicken, fish and beef meat samples, the team found that the AI system predicted the freshness of the meats with a 98.5% accuracy. As a comparison, the commonly used algorithm analysis only showed an overall accuracy of 61.7%.

The e-nose has been described in paper published in the scientific journal *Advanced Materials* as more accurate than a ‘best before’ label, which could help to reduce food waste.

Co-lead author Professor Chen Xiaodong, Director of the Innovative Centre for Flexible Devices at NTU, said: “Our proof-of-concept artificial olfactory system, which we tested in real-life scenarios, can be easily integrated into packaging materials and yields results in a short time without the bulky wiring used for electrical signal collection in some e-noses that were developed recently.

“These barcodes help consumers to save money by ensuring that they do not discard products that are still fit for consumption, which also helps the environment. The biodegradable and non-toxic nature of the barcodes also means they could be safely applied in all parts of the food supply chain to ensure food freshness.”

A patent has been filed for this method of real-time monitoring of food freshness, and the team is now working with a Singapore agribusiness company to extend this concept to other types of perishables.

**How it works**

In the e-nose, the 20 bars in the barcode act as the receptors. Each bar is made of chitosan (a natural sugar) embedded on a cellulose derivative and loaded with a different type of dye. These dyes react with the gases emitted by decaying meat and change colour in response to the different types and concentrations of gases, resulting in a unique combination of colours that serves as a ‘scent fingerprint’ for the state of any meat.

For instance, the first bar in the barcode contains a yellow dye that is weakly acidic. When exposed to nitrogen-containing compounds produced by decaying meat (called bioamines), this yellow dye changes into blue as the dye reacts with these compounds. The colour intensity changes with an increasing concentration of bioamines as meat decays further.

For this study, the scientists first developed a classification system (fresh, less fresh or spoiled) using...
an international standard that determines meat freshness. This is done by extracting and measuring the amount of ammonia and two other bioamines found in fish packages wrapped in widely used transparent PVC (polyvinyl chloride) packaging film and stored at 4°C over five days at different intervals.

They concurrently monitored the freshness of these fish packages with barcodes glued on the inner side of the PVC film without touching the fish. Images of these barcodes were taken at different intervals over five days.

A type of AI algorithm known as deep convolutional neural networks was then trained with images of different barcodes to identify patterns in the scent fingerprint that correspond to each category of freshness.

To gauge the prediction accuracy of their e-nose, the NTU scientists monitored the freshness of commercially packed chicken, fish and beef, with barcodes glued on the packaging film, stored at 25°C. Over 4000 images of the barcodes from six meat packages were taken at different time intervals over 48 hours without opening the different meat packages.

The research team first trained their system to pick out patterns among the scent fingerprints captured in 3475 barcode images, before testing the system’s accuracy on the remaining images.

The results revealed an overall 98.5% accuracy — 100% accuracy in identifying spoiled meats, and 96 to 99% accuracy for fresh and less fresh meats.

As a comparison, the research team randomly selected 20 barcode images from each freshness category to assess the prediction accuracy of Euclidean distance analysis, a commonly used method to measure the response of sensors like the barcode used in this e-nose. This analysis showed an overall accuracy of 61.7%.

The research team from NTU Singapore collaborated with scientists from Jiangnan University, China and Monash University, Australia.
Coffee bag packaging and filling machinery
Jet Technologies has introduced the Goglio VFFS Machine with block-bottom capability to the coffee industry in Australia and New Zealand.

The Vertical Form Fill Seal (VFFS) machinery is capable of producing and filling block-bottom gusset bags at high speed.

Suited to high-output coffee production environments, the machinery allows roasters to produce their own ‘block-bottom gusset bag’ without needing to purchase pre-made packaging.

Previously, brand owners have needed to purchase a pre-made bag to achieve the desired block-bottom look, which was typically filled either by hand or required a standalone filler, which added overhead costs.

Now coffee brands can use high-productivity VFFS machinery to simultaneously make and fill the Block-Bottom Gusset Bag to order and in line with demand.

The block-bottom design works to combine the functionality of a stand-up pouch with all the benefits of a side gusset bag. The Block-Bottom Gusset Bag is suitable for packaging a wide variety of coffee products such as whole bean or ground bean coffee.

Jet Technologies
www.jet-ap.com

Landfill-biodegradable pallet strapping
Landfill-biodegradable pallet strapping from BioGone is designed to protect goods and allow the strapping to be biodegraded away when disposed to a landfill.

Through its proprietary technology, BioGone has produced landfill-biodegradable pallet strapping. Unlike conventional strapping that does not break down, BioGone’s environmentally responsible alternative will be digested by the natural microbes in a landfill.

This innovative process is thanks to the addition of a proprietary organic additive, which is mixed with conventional polypropylene at the time of manufacture and allows the entire product to be consumed by microorganisms naturally present in a landfill.

The strapping comes in 1000 m rolls for hand strapping or 3000 m rolls for machine strapping. Available in two different widths — 12 and 15 mm — it will suit almost all applications.

The strapping is also recyclable with other plastic strapping or like plastics. Suitable for safely shipping products, the strapping joins BioGone’s increasing range of packaging products for shipping operations of all sizes.

BioGone
www.biogone.com.au
Every year billions of packages are transported worldwide, and both the carton and the tape are of paramount importance. The cardboard box does its job of protecting the contents while the tape keeps the package sealed, keeping the delicate cargo safe and secure until it arrives at its destination.

Taping a carton sounds simple, right? But this labour-intensive process forms a big part of the shipping and fulfilment process for many operations.

The packaging process involves several steps to bring a product and package together to expedite shipping to manufacturers, distributors and the consumer. The final stage at the end of the line is case sealing, a time-consuming process that is an indispensable activity to get packaged products to their final destination.

Today many operations embrace packaging automation for carton sealing versus hand taping or stapling, taking advantage of the many problems it solves, along with the benefits it provides.

Mechanical case sealing is a harmonious blend between man, machine, carton and tape. The food and beverage industry can leverage the many benefits of case sealing automation as detailed below:

### Case sealed: the benefits of packaging automation

<table>
<thead>
<tr>
<th>Benefit</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Capacity</strong></td>
<td>Case sealing automation boosts packaging line efficiency by reducing downtime and increasing productivity to get finished goods out the door faster.</td>
</tr>
<tr>
<td><strong>Quality</strong></td>
<td>Seals effectively prevent damage, contamination and tampering of your food/manufactured products hence protecting your brand equity and reputation.</td>
</tr>
<tr>
<td><strong>Safety</strong></td>
<td>Increases worker safety by reducing the risk of repetitive strain injuries caused by performing recurring tasks and movements typical in the taping process.</td>
</tr>
<tr>
<td><strong>Social distancing</strong></td>
<td>Assists in adhering to physical distancing measures in packaging areas due to the impacts of the COVID-19 pandemic on business operations.</td>
</tr>
<tr>
<td><strong>Waste reduction</strong></td>
<td>Automation ensures the correct amount of tape is used every time, minimising waste by eliminating double- or over-taping and uneven tape lengths to reduce material costs.</td>
</tr>
<tr>
<td><strong>Reduced factory/warehouse footprint</strong></td>
<td>Automation reduces the need for multiple packing benches and workstations associated with the manual labour process, freeing up valuable floor space for other processes or utilising smaller facilities to further reduce costs.</td>
</tr>
<tr>
<td><strong>Labour allocation</strong></td>
<td>Automation allows businesses to make significant labour savings and reallocate this valuable resource to other areas of the operation</td>
</tr>
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</table>

**3M-Matic Case Sealers**

For over 50 years, 3M has helped companies worldwide find better ways to improve the performance of packaging operations using its case sealing equipment and Scotch tape. 3M-Matic Case Sealers provide economical automation for carton sealing, offering a range of solutions with everything from semiautomatic adjustable systems to fully automatic random systems to increase capacity while decreasing packaging costs for a safer, more efficient and productive operation.

The case sealers combined with box sealing tape provide a total packaging system that delivers consistent, accurate sealing and advanced throughput, for virtually any packaging requirement and any size operation.

Some other benefits and features include: it meets all local electrical safety standards and compliance requirements; AccuGlide 3 Taping Heads patented technology is fast, reliable, accurate and low impact to protect carton and contents; pre-inspected, ensures they are ready to go when they arrive on the production floor; and a wide range of machines available, including fully automated, stainless steel and flap folding models.

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3M Safety & Industrial Business Group
www.3m.com
Woolworths launches recyclable meat trays

Woolworths has launched recyclable paper meat trays across a selection of its own-brand beef nationally as it looks to introduce more sustainable packaging.

The redesigned packaging — made up of a paper tray and fresh seal film — now uses 75% less plastic than the previous packaging and will eliminate 2.2 tonnes of plastic from the supply chain each year across seven popular beef cuts.

Unlike some meat trays, customers can recycle the new paper trays in their kerbside recycling bin by simply peeling back the vacuum films used to seal the meat.

The film covering and lining can also be recycled through the REDcycle bins located at every Woolworths store, along with any other household soft plastics.

Red meat is the latest line in focus, with the supermarket’s program to introduce more sustainable packaging across its products already removing 1320 tonnes of plastic from bakery and produce over the past two years.

Woolworths Head of Sustainability Adrian Cullen said, “We know sustainable packaging is important to our customers and we’re pleased to begin our transition to recyclable meat trays, starting with our Specially Selected and Grass Fed beef ranges.”

Your sustainable packaging needs covered

kp supplies a wide range of plastic packaging for fresh categories from protein to produce and convenience, made with 100% recycled PET.

Delivering innovative, sustainable rigid and flexible packaging solutions for everyday needs.
Water efficiency in the beverage industry — not a pipe dream

With rising demand and decreasing supply of water, it’s more important than ever for beverage and liquid food producers to examine usage and improve efficiencies.

Water consumption is expected to increase by 20–30% by 2050, thanks to growing population, socioeconomic development and changing consumption habits. Supply, though, is not keeping pace with rising demand.

Today, more than two billion people live in countries that are experiencing high water stress and water scarcity. About four billion people struggle with severe water scarcity for a period of at least one month every year. Water supplies and management have therefore become increasingly important issues for the brewing, beverage and liquid food industries.

Water is, after all, one of the most important ingredients for beverages. And in beverage production, water also performs many other important functions such as processing, cleaning and providing energy. For this reason, water must be reasonably and sparingly used in all process steps.

In December 2018, the Beverage Industry Environmental Roundtable (BIER) issued a study that covered the resource use levels for beer, mineral water, wine, spirits and carbonated soft drinks. The study collected and analysed the consumption levels of nearly 2000 companies around the world. The results of the study for the water–product ratio are shown in Table 1. One clear finding is the dependence based on company size. Table 2 shows this in terms of beer brewing.

As a result of future conditions, supplies are expected to fall while demand and consumption rise. For this reason, beverage and liquid food producers will have to comprehensively examine their use of water.

There are many good reasons for them to do so: First, every litre of water and wastewater generates costs, which are expected to rise. Second, global players are working to create standardised production — designing processes with water use in mind. Third, new sources must be searched for and developed in response to water scarcity and the need to protect deep water. Fourth, water is an aspect of corporate social responsibility. And, last but not least, the careful use of resources has affected consumers’ purchasing behaviour and approval processes for new and expansion investments for a long time, as a recent example from Mexico shows. Following a referendum of residents in the city of Mexicali, a brewing operation that is owned by US company Constellation Brands and 65% complete was prohibited from going into operation. A total of 76.1% of voters spoke out against the start of production because the brewery could draw off water that the arid region so desperately needs.

Growing demands for residual-free water

At the same time, demands for residual-free water, bottled water, brewing water, mixing water and dilution water are growing. No undesired substances may be found by state-of-the-art analytical systems, regardless of the source of the water. It is a tremendous challenge in times when even the groundwater can contain residual amounts of medication, herbicides like atrazine and the ever-present nitrates. New or stricter thresholds like those that cover uranium, bromate and perfluorinated compounds are being introduced as well.

The demand for ‘residual free’ is increasingly being met through technologies such as membrane-separation processes based on ultra- or nanofiltration and reverse osmosis. In these processes, all substances are almost quantitatively separated and then brought to the desired quality level with high-purity salts or blending water in accordance with technological or internal company guidelines.

Other technologies like ion exchangers or lime precipitation continue to serve their purpose as well. An exchanger is an appropriate way to remove individual ions like nitrate or uranium. Lime precipitation is a very low-cost method for the appropriate raw water composition and produces very little wastewater. Lime
is also a product of nature. For this reason, lime precipitation can be an attractive alternative for companies that must meet tough organic guidelines or for tradition-conscious craft brewers. Selective adsorbers that can be used to systematically remove arsenic are another option, too.

Let’s turn now to membrane processes: they are increasingly seen as a solution in other usage areas. This includes the protection of organic water quality in addition to wastewater treatment or water degassing. After all, the use of chlorination — an important and necessary step in many regions — can produce by-products, and ozonisation converts bromide into bromate. The corresponding threshold in the EU is 0.010 mg/L. But many international companies apply even tougher quality standards. This is where ultrafiltration with its log rate of six comes into play. This reduces germ levels by 99.9999% in treated water. Afterwards, no additional sterilisation work by producers is necessary or they only have to treat the headspace of the bottle with ozone. The threat of bromate formulation is also reduced.

Intelligent recycling strategies moving to the forefront

Modern water management is more than just ensuring sufficient amounts of fresh water. It also involves separating resources from wastewater streams and reintroducing them to the cycle. Intelligent recycling strategies are thus becoming increasingly important.

In principle, there are two practical ways to recycle water. In the first approach, water is collected in a pH- or impurity-based manner and re-used in comparable areas. The second approach is the end-of-pipe solution. All wastewater is centrally collected and is anaerobically cleaned. The biogas created in the process can be used to meet 20 to 30% of a brewery’s energy needs. Another possibility would be a downstream zero liquid discharge step in which about 95% of wastewater can be returned to an operation.

Theoretically, the final volume produced by the zero liquid discharge step could be treated until it reached process water quality. As purified process water, it could replace some of the drinking water used in widely established brewing processes. Like the use of rainwater in households, brewers would need a separate process water network for this step. A new facility would certainly have more space for such a system than an existing building would. This option also leaves one general problem unsolved: if the frequency of water use rises, the electricity consumed as part of processing and transport will increase too.

On the way to a brewing utopia

A working group on water technology in the Department of Food Chemistry and Molecular Sensory Science at the Technical University of Munich has come up with a completely new way to treat wastewater: fuel cells. The ‘brew cell’ enables wastewater to be treated and electricity to be generated at the same time. The process uses exoelectrogenic bacteria to evaluate organic substances in wastewater and to transfer the electrons gained in the process to an electrode. The electrons will then flow through external resistance on their way to a cathode. Under the presence of previously obtained protons (H+), hydrogen is reduced to water.

The brew cell has already made the jump from the lab. The first pilot unit went into operation at a major German brewer in the autumn of 2019. The findings that researchers have gained there will be one of the topics covered at drinktec 2021. Other relevant aspects of water as a resource will be presented first hand to the international brewing, beverage and liquid food industries at the drinktec trade fair from 4–8 October 2021.
Traceability app

To combat the potential risks of globalised supply chains, product recalls and counterfeit goods, Facteon has developed a dynamic traceability app to help manufacturers achieve traceability from pasture to plate or compound to blister pack.

The traceability app has the ability to: collect raw material and product information in real time; track critical failure points through the full value chain; visualise machinery maintenance and cleaning information by scanning a QR code; track a product from its origins to finished goods by scanning a QR code; and integrate with existing business systems to deliver end-to-end traceability.

With machine-to-cloud connectivity and the ability to track specific product batches rapidly, Facteon’s traceability app has been developed alongside, rather than for, manufacturers.

Key features and benefits include: efficiency gains by eliminating the potential for product waste and machinery downtime due to inaccurate data collection or entry into a computerised system; reduce hardware costs by replacing QR code and barcode readers with a mobile phone; reduce time spent on health and safety procedures, food safety and audits.

Facteon
facteon.global

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Sanitary bulk bag filling system

A sanitary bulk bag filling system from Flexicon features dual SWING-DOWN fillers fed by high-capacity weigh hoppers, achieving fill rates of up to 40 bulk bags/h.

The patented filler design simultaneously lowers and pivots each fill head into a vertically oriented position that places the inflatable spout connection collar, inflator button and four bag loop latches within reach of an operator standing on the plant floor. This is designed to increase the safety and speed of connecting bulk bags, as the operator can connect each bag loop and the bag spout without having to stand on a ladder or reach over equipment to secure the bag.

Bagging rates are further increased by reducing the time needed to load material into the bag. Whereas conventional fillers are typically mounted on load cells, allowing a PLC to open and close a valve or start and stop a conveyor to slowly fill the bag by weight, the new system employs dual gain-in-weight hoppers positioned above the bulk bag fillers. This allows preweighed material to descend into the bag at high rates, and saves additional time by refilling the weigh hopper while the full bag is being removed and an empty bag is being connected.

Once the inflator button is pressed and the collar secures the bag spout, filling operations are automatic: the fill head raises and returns to horizontal orientation; a dedicated blower fills the bag with air which removes creases in the bag, allowing the material to fill corners to create a stable bag; the surge hopper’s roller gate valve opens; pre-weighed material fills the bag; the valve closes; the inlet seal deflates; and the bag loop latches release, allowing a forklift to remove the filled, palletised bag.

Ports on each filler are vented to a dust collection system to prevent displaced air and dust from escaping into the plant environment.

While a bag is being filled and then forklifted on one side, an operator can connect an empty bag on the opposite side, maximising output.

Widened base frames allow filling of portable totes in addition to bulk bags.

The all-stainless steel system is finished to sanitary standards and equipped with a corrosion-resistant, water-tight and dust-tight controls enclosure, allowing washdown.

The company also manufactures bulk bag dischargers, bulk bag conditioners, drum fillers, drum/box/container tippers, bag dump stations, flexible screw conveyors, tubular cable conveyors, pneumatic conveying systems, weigh batching and blending systems and engineered plant-wide bulk handling systems with automated controls.

Flexicon Corporation (Aust) Pty Ltd
www.flexicon.com.au
Rack Armour is the simple superior solution to pallet racking damage caused by forklifts.

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www.rackarmour.com.au

t: (02) 9722 0502

e: info@rackarmour.com.au
Avoiding plastic when palletising

Founded in 1958, UFA is a Swiss manufacturer of compound feed, mineral salts and milk powder. When a new bagging system was purchased for its specialty plant in Sursee, Switzerland, in 2018, the company needed to decide if the pallets should be glued again or shrink-wrapped in plastic film.

The company had previously investigated how to avoid plastic when palleting their feed sacks and opted for the AntiSlip Gluing solution from Robatech in 2008. The contact-free hot melt spray application is designed to run reliably and ensure transport safety without plastic film.

With worldwide focus on avoiding plastic, this was reason enough for the company to equip its new bagging system again with AntiSlip Gluing.

At the new bagging plant, 500 bags per hour are filled, sewn and labelled. For subsequent palletising, two AX-Diamond spray heads apply four hot melt spirals to the surface of the passing feed sack without contact. After that, a robot stacks layers of three sacks each on the pallet. Once two layers are stacked, a lift moves the pallet upwards and briefly presses the sacks against a press plate. This increases the adhesion between the layers, and the finished palletised stack can then be transported safely. Each layer is pressed, with the product counter of the Robatech application system ensuring that the last three sacks remain without adhesive application.

The delivery of palletised goods for animal feed preparation results in more than 2 tons of plastic film that must be disposed of yearly at the specialty plant. The gluing solution avoids passing on the plastic to the customers in the first place.

Urs Steiner, Head of Production at UFA Sursee, paid particular attention to a straightforward clarification: “We inquired within the company, and the decision was clear for hot melt adhesive application. Shrink-wrapping would require more effort, space and, assuming a throughput of 25,000 pallets per year, higher material costs. Our customers must already dispose of the feed bags. They would then still have piles of film."

**Flexibility through modularity**

UFA produces in a two-step process. In the mixing plant, the delivered powdery substances are weighed in batch mode, mixed homogeneously and stored in a silo. In the next step, the powdery mixture is continuously blown from above into a spray tower and free-fall enriched with hot fat, which is sprayed laterally. The cold air introduced from below creates a crystalline, flowable product.

“With the new bagging system, we have been able to increase from eight to ten layers. That is a logistical advantage,” Steiner said. “However, not only did the gravity-controlled pallet rack have to be modified, but the existing adhesive application process had to be adapted as well. In the past, we just glued on one side. That worked well. With the increase to ten layers per pallet, we had to increase the stability.”

Robatech then equipped the existing Concept melter with two next-generation AX spray heads.

“Thanks to the high backward compatibility and the modular design of the Robatech products, that was no problem at all,” Steiner recalled. “Beyond that, with the CoolTouch insulation on the Diamond application heads, you no longer have to burn your fingers. The energy efficiency is much better because the insulated application heads guarantee consistent adhesive temperature.”

Reliable gluing quality is crucial for safe palletisation and straightforward de-palletisation. After all, the bags should arrive at the customer undamaged and be easily removed without tearing.

Steiner sums up his experience with the pallet stabilisation solution from Robatech: “We are very pleased with the AntiSlip Gluing solution. The process is an excellent solution for us, for our customers and for avoiding plastic waste.”

Robatech Australia Pty Ltd
www.robatech.com.au
NSW Sydney researchers said the versatile technology could be widely applied in sectors where fragile objects are handled, such as agriculture, food and the scientific and resource exploration industries — even for human rescue operations or personal assistive devices.

Dr Thanh Nho Do, UNSW Medical Robotics Lab director, said the gripper could be commercially available in the next 12 to 16 months if his team secured an industry partner.

He is the senior author of a study featuring the invention, published in *Advanced Materials Technologies* this month.

“Our new soft fabric gripper is thin, flat, lightweight and can grip and retrieve various objects — even from confined hollow spaces — for example, a pen inside a tube,” Do said.

“This device also has an enhanced real-time force sensor which is 15 times more sensitive than conventional designs and detects the grip strength required to prevent damage to objects it’s handling.

“There is also a thermally activated mechanism that can change the gripper body from flexible to stiff and vice versa, enabling it to grasp and hold objects of various shapes and weights — up to 220 times heavier than the gripper’s mass.”

**Nature-inspired robotics**

Dr Do said the researchers found inspiration in nature when designing their soft fabric gripper.

“Animals such as an elephant, python or octopus use the soft, continuum structures of their bodies to coil their grip around objects while increasing contact and stability — it’s easy for them to explore, grasp and manipulate objects,” he said.

“These animals can do this because of a combination of highly sensitive organs, sense of touch and the strength of thousands of muscles without rigid bone — for example, an elephant’s trunk has up to 40,000 muscles.

“So, we wanted to mimic these gripping capabilities — holding and manipulating objects are essential motor skills for many robots.”

**Improvement on existing grippers**

Dr Do said the researchers’ new soft gripper was an improvement on existing designs that had disadvantages that limited their application.

“Many soft grippers are based on claws or human hand-like structures with multiple inward-bending fingers, but
this makes them unsuitable to grip objects that are oddly shaped, heavy or bulky, or objects smaller or larger than the gripper’s opening,” he said.

“Many existing soft grippers also lack sensory feedback and adjustable stiffness capabilities, which means you can’t use them with fragile objects or in confined environments.

“Our technology can grip long, slender objects and retrieve them from confined, narrow spaces, as well as hook through holes in objects to pick them up — for example, a mug handle.”

Lead author Trung Thien Hoang said the researchers’ fabrication method was also simple and scalable, which allowed the gripper to be easily produced at different sizes and volumes — for example, a one-metre-long gripper could handle objects at least 300 mm in diameter.

During testing, a gripper prototype weighing 8.2 g could lift an object of 1.8 kg — more than 220 times the gripper’s mass — while a prototype 13 cm long could wrap around an object with a diameter of 30 mm.

Professor Nigel Lovel, who also worked on the invention, said they used a manufacturing process involving computerised apparel engineering and applied newly designed, highly sensitive liquid metal-based tactile sensors for detecting the grip force required.

“The gripper’s flat continuum also gives it superior contact with surfaces as it wraps around an object, while increasing the holding force,” he said.

“What’s more, the total heating and cooling cycle for the gripper to change structure from flexible to rigid takes less than half a minute, which is among the fastest reported so far.”

**Integrating robotic arms and the sense of touch**

Dr Do has filed a provisional patent for the new gripper, having successfully tested and validated the technology as a complete device.

“We now aim to optimise the integrated materials, develop a closed-loop control algorithm and integrate the gripper into the ends of robotic arms for gripping and manipulating objects autonomously,” Do said.

“If we can achieve these next steps, there will be no need to manually lift the gripper, which will help for handling very large, heavy objects.

“We are also working on combining the gripper with our recently announced wearable haptic glove device, which would enable the user to remotely control the gripper while experiencing what an object feels like at the same time.”

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**Counterbalance forklifts**

The Mitsubishi and Nichiyu FBCB series of 4-wheel electric counterbalance forklifts range is now available with a choice of nine models. The series has an updated, modern looking design and capacities ranging from 1000 to 3500 kg.

With the combination of a wide variety of optional features and a waterproof rating of IPX4, the FBCB forklifts range is designed to provide users with an electric truck that will work across all platforms of light- and heavy-duty work cycles to help ensure reliability and a consistent operation.

Even throughout long shifts, drivers can stay comfortable in the spacious and highly 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 is designed to allow for increased operator confidence when travelling, cornering and lifting with intuitive speed control. It can keep travel consistent on inclines, responding as if it were driving on a flat surface.

A choice of operation modes can be customised 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 hours) while also reducing running costs. If the FBCB series is left idling with no operation for 15 minutes, an auto power-off comes into effect further conserving energy.

While the base model is highly suited to many different working situations, a wide choice of options and attachments is available, allowing the truck to be specified to meet user requirements. PIN code entry can be enabled at an administrator level to allow tight control over its operation.

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Decontaminating nuts

Food manufacturers are always trying to minimise the risk of recalls due to contamination. Almonds, a popular treat around Christmas time, are one of the more susceptible foods. Now, researchers at the Fraunhofer Institute for Environment, Safety, and Energy Technology UMSICHT have developed a new process to kill off germs that can befall almonds and nuts — using compressed carbon dioxide to decontaminate food.

Processing can affect the quality of food, particularly that of plant-based products that are consumed raw. These foods may be contaminated with Salmonella that can cause food poisoning. These bacteria can even spread to dry foods, which experts call products with low-water activity. This group of low-moisture foods includes almonds, nuts, dried fruits, spices, milk powder and even tea.

Karen Fuchs, a researcher at Fraunhofer UMSICHT in Oberhausen, said Salmonella can go dormant to survive on almonds.

“In the process, they produce additional biomass that protects them from desiccation. If water enters the picture, Salmonella then proliferate explosively.

“But it takes just ten to one hundred of these bacteria to cause food poisoning. Contaminated almonds that make their way into production facilities after harvesting can also contaminate other batches.”

In a joint project with the University of Alberta in Canada, Fuchs and her team investigated technologies that could serve to decontaminate almonds. The German Federal Ministry of Education and Research (BMBF) funded this research venture called MiDeCO2.

“It is common knowledge that pressurised carbon dioxide can kill pathogenic bacteria in liquids such as orange juice. Our research has shown that under certain conditions this also works with dry food,” Fuchs said.

Carbon dioxide is not harmful to the environment or health and can be separated from almonds without a trace of residuals. This does not involve any energy-intensive steps for purification.

Retaining the flavour of almonds

In one process step almonds are decontaminated and impregnated with antimicrobial oils using compressed carbon dioxide in a high-pressure autoclave.

The oil extract coats the almond, making it difficult for germs to re-contaminate the fruit. The reported advantage of this process is that almonds retain their characteristic flavour and quality. Fuchs and her team carried out tests with Staphylococcus carnosus, a surrogate organism known for an even more resistant reaction than Salmonella, proving that the process in the autoclave does not adversely affect the shelf life, rancidity or lipid composition of almonds.

“The oils are not just antibacterial; they also have antioxidant properties. They increase the oxidation potential and extend the shelf life of fats, meaning that almonds are not as quick to go rancid,” Fuchs said.

Fuchs said that the antibacterial and anti-oxidative properties are not the only potential benefit. Increasing the amount of oils that harmonise well with almonds’ flavour could also add a tasty touch of seasoning.

This process also lends itself to other foods. The increased lipid oxidation potential could benefit any food that is prone to oxidation.
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Value through expertise
**Multi-species, cell-based meat on the menu**

Cell-based meat start-up Vow recently held a culinary demonstration of its multi-species meat platform.

The dishes were designed, prepared and presented by well-known chefs Neil Perry and Corey Costelloe. Six different animal species were selected from Vow’s cell library and cultivated (grown from cells in a cultivator) for this product demonstration, including kangaroo, pig, lamb, alpaca, rabbit and goat.

Blending technology with the culinary world opens a new creative era in food, and does so in a way that’s sustainable for future generations, Neil Perry said.

“Until now the cultured meat industry has been focused on better ways of making the meat we most commonly eat today,” said George Peppou, Co-founder and CEO of Vow.

“This milestone demonstrates we can grow the cells of any animal, not just those we can farm, marking a turning point for the cultured meat industry and our food system as a whole. To make food without compromise we must stop looking backward to how our ancestors produced and ate food and instead choose how we will eat in the future.”

Vow launched 16 months ago and has a team of 16 scientists, engineers and designers in Australia. The company is now turning its focus on building a meat prototype that “outperforms the sensory experience of any conventional meat we know”, according to Tim Noakesmith, Co-founder and Chief Commercial Officer of Vow.

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**Yellow food colouring**

GNT Group has extended its range of yellow EXBERRY Coloring Foods with a new powder made from carrots.

Available worldwide in addition to the existing liquid format, the EXBERRY Shade Yellow — Cloudy Powder enables manufacturers to deliver a yellow colour shade in a wide range of applications.

The powder can be used in bakery applications as well as dry mixes including custard, brioches and biscuits.

Both the liquid and powder formats are made from carrots grown by GNT’s farmers and are manufactured without chemical solvents.

The EXBERRY Shade Yellow — Cloudy Powder is pH independent and provides good light and heat stability, along with a 12-month shelf life at <25°C.

**EXBERRY**

www.exberry.com

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**Plant-based food culture**

Fermenting with Chr. Hansen’s FreshQ DA in the food culture solution is designed to help improve the robustness of fermented products against spoilage throughout the value chain, maintaining quality for longer to optimise consumer satisfaction.

Now in its third generation, the latest version is aimed at the growing market for fermented plant-based foods.

FreshQ DA consists of lactic acid bacteria selected for its ability to out-compete contaminants through fermentation.

The product implements bioprotection — an innovation that uses ‘good bacteria’ to fight ‘bad bacteria’, yeast and mould, to help keep food fresh from the inside out.

Extending freshness can enable producers to optimise production and logistics, reducing waste in the value chain. It also gives consumers a longer window during which to eat the food.

**CHR Hansen Pty Ltd**

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Researchers fight billion-dollar wine fraud industry

Wine researchers are developing a fast and simple method of authenticating wine — a potential solution against the estimated billions of dollars' worth of wine fraud globally and offering a possible means of building regional branding.

The team of scientists from the University of Adelaide were able to identify the geographical origins of wines originating from three wine regions of Australia and France with 100% accuracy with a novel technique of molecular fingerprinting using fluorescence spectroscopy — a technology that analyses fluorescence of molecules.

PhD student and researcher Ruchira Ranaweera said that wine fraud is a significant problem for the global wine industry, given a yearly economic impact within Australia alone estimated at several hundred million dollars and globally thought to be billions of dollars.

“Wine authentication can help to avoid any uncertainty around wine labelling according to its origin, variety or vintage. The application of a relatively simple technique like this could be adapted for use in the supply chain as a robust method for authentication or detection of adulterated wines.”

The researchers looked at Cabernet Sauvignon — a globally significant grape variety and the second most planted in Australia — from three different wine regions of Australia and Bordeaux in France, the birthplace of Cabernet Sauvignon.

The research has been published in the journal Food Chemistry and was supported by Wine Australia and the Australian Government, the Waite Research Institute and industry partners through the ARC Training Centre for Innovative Wine Production.

The researchers compared an existing approach for authentication, which involves measuring elements in wine samples using inductively coupled plasma-mass spectrometry (ICP-MS), with the more simple, rapid and cost-effective fluorescence spectroscopy technique.

“This method provides a ‘fingerprint’ of the samples according to the presence of fluorophoric or light-emitting compounds,” Ranaweera said.

“When used in combination with a robust data analysis using a particular machine learning algorithm, it is proving to be a powerful technique for authentication.”

In every wine they tested using the novel combination of fluorescence spectroscopy with machine learning-driven data analysis, they correctly allocated the wine to its region with the fluorescence data but not with elements determined by ICP-MS.

There are other useful applications of this technology for the wine industry available now or in the pipeline, such as phenolic and wine colour analysis, and smoke taint detection.

Project leader Associate Professor David Jeffery said they hope to identify specific chemical markers that help discriminate between wine regions.

“Other than coming up with a robust method for authenticity testing, we are hoping to use the chemical information obtained from fluorescence data to identify the molecules that are differentiating the wines from the different regions,” Jeffery said.

“This may help with regional branding by understanding how their wines’ characteristics are influenced by the region and how they differ from other regions.”

https://www.adelaide.edu.au/
Yellow food colouring
Bioscience company Chr. Hansen Natural Colors has released a yellow colour made from turmeric.

The FruitMax Yellow 1000 WSS colour can be used across a range of applications such as in confectionery, ice cream, snacks, bakery and meals.

Turmeric produces a bright yellow and is claimed to be a cost-effective alternative to safflower and orange carrot.

The company said special attention had been placed on minimising the ‘off’ taste that can accompany turmeric.

The colouring is suitable for a wide variety of non-transparent packaged foods, as turmeric is known for light sensitivity.

For legislative reasons, FruitMax Yellow 1000 WSS is likely to find its core markets in Europe, Latin America and APAC. It is fully compliant with the EU Colouring foodstuffs guidelines, and therefore is a clean label colour that can be listed as turmeric extract.

CHR Hansen Pty Ltd
www.chr-hansen.com

Peeled, hard boiled eggs
Sunny Queen has added Peeled Hard Boiled Eggs to its product range.

A key feature of the eggs is their perfectly positioned yolks. Achieved by using innovative equipment, the yolk of the egg is positioned in the centre of the egg, which benefits customers who use sliced or wedge-cut eggs in their menu offering.

With a shelf life of 28 days, the eggs come cooked, peeled and ready to be used.

Sunny Queen’s Peeled Hard Boiled Eggs come in trays with perforation — the 2.5 kg pack (containing an average of 50 eggs) comes perforated in the middle allowing the pack to be split in two, with an average of 25 eggs per side, to preserve the freshness of the eggs.

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Bright orange food colouring

GNT Group has launched two EXBERRY Coloring Foods that deliver bright orange shades in powder and oil-dispersible formats.

Made from paprika and carrot, the new Brilliant Orange products provide solutions for a range of applications.

The EXBERRY Shade Brilliant Orange powder is oil-soluble and water-dispersible. It is designed for a broad range of applications including non-aerated confectionery, bakery and savoury products. The oil-dispersible EXBERRY Shade Brilliant Orange Intense, meanwhile, can be used for compound coatings, spray-coated oil seasonings and other fat-based applications.

The powder and oil-dispersible options are available in addition to the existing EXBERRY Brilliant Orange liquid format.

The new products are pH-independent and offer good light and heat stability as well as a good shelf life. They are 100% plant-based, halal and kosher, and made without any chemical solvents.

EXBERRY
www.exberry.com
The cheese fondue seems to be so simple to make — mix wine, cheese, starch powder and spices, warm it up, stir and eat. But the science is actually much more complex.

The dish is really a complex multiphase system caused by the rheology of the cheese, wine and starches, which can make all the difference between a creamy meal and a goopy mess of separated ingredients. At its most basic, a cheese fondue is water with a dispersed mixture of fat droplets, caseins and starch granules with the concentration and quality of the latter being of particular importance.

Scientists at the Institute of Food Nutrition and Health in Zurich investigated how to make a perfect fondue with the right texture, flavour, mouthfeel, viscosity and bread clinginess.

The perfect fondue must be able to coat the bread, defy gravity, give the right feel in the mouth and release its flavour without being too thick or too watery. In addition, the ingredients need to integrate with one another so the fondue doesn’t curdle or separate.

Essentially, the cheese that goes into the fondue is a protein gel that encases globules of fat. As the cheese melts, the gel network shrinks and collapses, releasing the fats. Adding wine to make up 30–40% of the weight, especially if it’s dry with a low pH, introduces both water and ethanol into the cheese, dispersing the proteins and emulsifying the fat globules. By adding a starch made from potatoes, maize or carrageenan amounting to 3% of total weight prevents the proteins, water and fats from separating. As it gelatinises, the starch also increases the viscosity.

The tricky bit is to get the fondue to settle around the gel point. That is, the point where the viscosity is set to make a sudden change from liquid to solid. By balancing the various electrostatic forces of the ingredients, the right level of viscosity can be achieved.

What this boils down to in the caquelon is that by carefully balancing the ingredients, especially the wine, and using the most efficient starch, like carrageenan, it’s possible to make a cheese fondue with just the right creaminess, and it even makes it more digestible.

Ah — finally an excuse to use that fondue set that’s been hanging around for decades.

The research was published in ACS Omega.
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