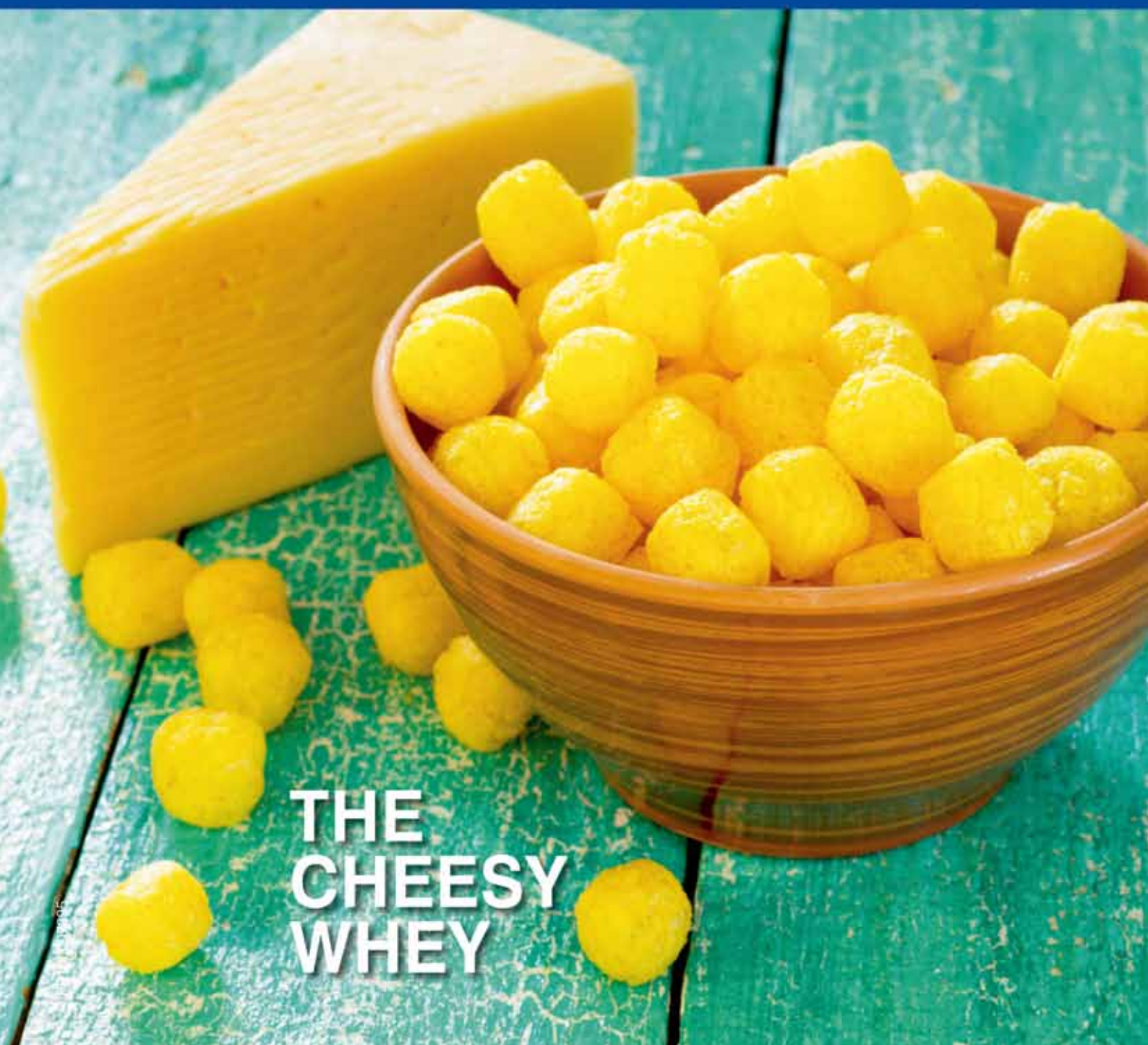


January/February 2020  
Vol.27 No.5

# what's <sup>new</sup> in **Food** technology & manufacturing



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# Sugar, sugar — not so sweet



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It has been estimated that around 15% of our daily kilojoule intake comes from added sugars. With a growing list of over 50 alternative names for sugar used by food manufacturers in product labelling, consumers are becoming more confused about where these kilojoules are coming from, which is leading to an over-consumption of sugar. New labelling rules are set to be introduced in the US to reduce this confusion over added sugars, while Australia and New Zealand are looking into a pictorial approach for added sugar labels.



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In the US, the FDA is implementing mandatory rules that will mean manufacturers must declare all added sugars. Set to take effect this year (2020), the new label requires that the amount of added sugar is declared together with the percentage of the Daily Value for Added Sugars. This is based on a daily value of 50 grams (12.5 teaspoons of sugar) of added sugar per day.

In Australia and New Zealand, many consumers are unaware of their overconsumption of added sugars as information about added sugars on food labels is limited and/or unclear. In response to a policy paper on the labelling of sugars on packaged foods and drinks, Ministers have agreed that a pictorial approach applied to sugary beverages/sugar-sweetened beverages should be looked at.

In Australia, the non-alcoholic beverage industry has also committed to reduce sugar by 20% by 2025. The first report on the industry's progress towards its sugar reduction pledge initiative was released in November 2019, with a 7% reduction in sugar being announced. Some of the initiatives implemented include: a reformulation on existing drinks; a cap on sugar content on all existing drinks and new recipes; increasing volume of low- and no-sugar drinks; smaller packs; and working with community groups to promote healthy choices.

Food manufacturers will be on the lookout for alternatives to sweeten up their products without the added kilojoules. Inulin has been reported to have had success as a natural sugar replacer and it can also be used to enhance fibre content on the label. A type of soluble fibre found in many fruits and vegetables, such as bananas, onions, wheat and chicory root, inulin is made up of chains of fructose molecules. Other examples on trend include: vanilla to sweeten milk, dates, agave and brown rice syrup.



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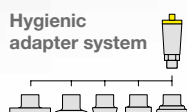
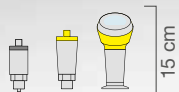


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## Could a human gut microbe make processed foods healthier?

A new study from Washington University School of Medicine in St. Louis sheds light on how human gut microbes break down processed foods — especially those potentially harmful chemical changes. The findings could make it possible to use such knowledge of the gut microbiome to help develop healthier, more nutritious processed foods.

Published in the journal *Cell Host & Microbe*, the scientists studied mice to identify a specific human gut bacterial strain that breaks down the chemical fructoselysine, and turns it into harmless by-products.

“Fructoselysine is common in processed food, including ultra-pasteurised milk, pasta, chocolate and cereals,” said first author Ashley R. Wolf, PhD.

When fed a diet containing high amounts of fructoselysine, mice harbouring *Collinsella intestinalis* in their gut microbial communities showed an increase in the abundance of this bacteria as well as an increase in the gut microbial communities’ ability to break down fructoselysine into harmless by-products.



## Sugar reduction pledge: drink companies cut sugar by 7%

In June 2018, Australia’s non-alcoholic beverage industry committed to reduce sugar across the industry by 20% by 2025. On behalf of the Australian Beverages Council, KPMG has provided the first report on the industry’s progress towards its sugar reduction pledge initiative, with a 7% reduction<sup>[1]</sup> in sugar being announced today (25 November).

The signatories to the pledge, Asahi Lifestyle Beverages, Coca-Cola Amatil, Coca-Cola Australia and PepsiCo Australia, have contributed to the reduction in sugar across their portfolios, and more drinks companies are expected to join in the future.

Some of the initiatives implemented include: a reformulation on existing drinks; a cap on sugar content on all existing drinks and new recipes; increasing volume of low- and no-sugar drinks; smaller packs; and working with community groups to promote healthy choices.

1. 7% reduction in sugar has been achieved by average reductions in total grams of sugar per 100 mL and includes the period 1 January 2015 to 31 December 2018.

## Adapting to consumer lifestyles nets award for roast pork producer

The Australian Food Awards have recognised a Riverina-based producer for its ready-to-eat roast pork complete with crunchy crackle, awarding it the Gold Medal in Convenience Main Meals category, Best Convenience Main Meal and the Champion Australian Convenience Food trophy.

Riverview Farms Pork Roast with Crackle was also a finalist for Australian Product of the Year. The product is sold cooked, hot and ready to eat, much like the hot chickens favoured by many consumers every week.

Busy lifestyles, evolving consumer tastes and hesitation over how to cook the perfect pork roast are thought to be some of the reasons behind the ubiquity of convenient options like this.

“Consumers are making more frequent, smaller trips to the supermarket each week and ready-made meals and precooked products are high on the shopping list. Hot convenience foods offer consumers inspiration for ‘what will be for my dinner tonight’ or ‘my lunch right now,’” said Ashley Hoffmann,



Riverview Farms Brand Manager.

Choosing to innovate to meet the needs of the modern consumer has helped Riverview Farms secure a leadership position for pork in the ‘grab and go’ meals category.



Left to right: Ian Prunell, Mark McKenzie and Ashley Hoffmann from Riverview Farms.





## Four Pillars Gin wins 2019 International Gin Producer award

Yarra Valley-based distillery Four Pillars Gin has been awarded the 2019 International Gin Producer of the Year at the 50th Annual International Wine and Spirits Competition (IWSC) in London.

IWSC is claimed to be the world's largest and most prestigious international competition for spirits with more than 3000 entries from all corners of the globe. Four Pillars is the first Australian distillery to be awarded the 2019 International Gin Producer of the Year, and Co-founder and Distiller Cameron Mackenzie accepted the award in London on 28 November 2019.

"To win this award, on the eve of our sixth birthday, is really, truly, bloody incredible," Mackenzie said.

"This award is a tribute to every single person who has helped us make, sell, create, drink or buy one of our gins. This is reward for all of them. This award is not for a single one of our gins but for the whole of our gin business, and that's what makes it so incredibly special."

Four Pillars was founded by Cameron Mackenzie alongside drinks industry veteran Stuart Gregor and creative brand strategist Matt Jones in 2013 and the business took on Lion (a subsidiary of Kirin) as a 50% shareholder in April 2019. The three founders remain at the helm of the business and Four Pillars is today distributed in more than 30 markets across the world. It now produces around 100,000 cases of gin annually (equivalent to 600,000 bottles).

"When we started making test batches of gin back in 2012 we never in our maddest, wildest dreams thought this could happen so quickly. To say that I am in a state of disbelief would be vastly understating the true state of my disbelief," Mackenzie said.

"The previous two winners of this award are Hernö from Sweden in 2017 and Kyoto Distillery in Japan last year so we couldn't be in better company. They are two of the greatest distilleries and two of our best mates in the world of gin."

Australia is in the middle of a gin boom that has seen consumption of locally produced gin grow by 33% in 2018 and likely a similar number in 2019. It is estimated that there are around 180 distilleries in Australia producing gin today, whereas in 2013 there were fewer than 15. In the past five years (2013–2018), Australian consumption of gin has increased by 15.2% per annum and Four Pillars has grown at an average 83.4% a year since its launch in 2013 (IWSR reports).

## Solving the lettuce outbreak crisis in the US

Another unsolved *E. coli* outbreak linked to romaine lettuce in the US has highlighted the need for better investigative tools.

The Centers for Disease Control and Prevention in the US announced on 4 December that a multi-state outbreak of *E. coli* O157:H7 tied to romaine lettuce has expanded to over 100 people in 23 states, and the full scope of this outbreak is still not yet known.

This outbreak is caused by the same strain of *E. coli* that caused outbreaks linked to leafy greens in 2017 and to romaine lettuce in 2018.

The Center for Science in the Public (CSPI) expressed the need for new tools to help the Food and Drug Administration solve outbreaks.

One of these tools is the Expanded Food Safety Inspection Act, which is hoped to be introduced as legislation as it could provide a tool for investigators to trace back outbreaks that emerge from large concentrated animal feeding operations.

The CSPI is also calling to expand and enhance the FDA's authority under the Food Safety Modernization Act to ensure that food can be traced throughout the food system as it moves from farm to fork.

The organisation hopes these improvements will allow for swift, targeted recalls during outbreaks of foodborne illness.

Thankfully there have been no reported deaths from the latest outbreak, but as of 2 December 2019 a total of 102 people have been infected.

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## Solar success at Foodmach

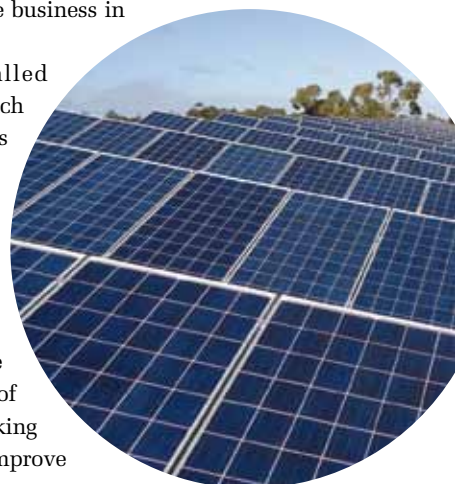
Foodmach is one of Australasia's largest privately owned and operated packaging machinery manufacturers and integrators. In 2013, its manufacturing facility located in Echuca, Victoria, was fitted with a 100 kW solar system by Norlec Solar.

To date, the system has yielded 1 GW of energy, representing over 700 tonnes of CO<sub>2</sub> emissions reduction — or the equivalent of a car travelling 3.5 million kilometres. The electricity generated would be enough to power the 5900-plus houses in Echuca for nearly a week.

The 400 solar panels on 5400 m<sup>2</sup> roof of the facility save around 44% of the total electricity drawn by the business in its manufacturing operations.

LED lighting was also installed throughout the premises in 2013, which has saved around 30% of previous electricity usage for lighting.

Foodmach CEO Earle Roberts said: "We installed the panels and LED lighting in an effort to reduce our carbon footprint and mitigate ever-increasing power costs. Foodmach is committed to the sustainability and competitiveness of our products. We're constantly looking for ways to reduce emissions and improve energy efficiency."





# Food

## FOR thought



### Is lupin the next superfood?

Curtin University researchers are developing a commercially viable way to turn lupin seed waste into a treatment for high blood glucose, benefiting people with Type 2 diabetes. The research collaboration will allow Curtin food scientists, chemical engineers and biomedical scientists to develop new technology to extract high purity gamma-conglutin — a naturally occurring protein derived from lupins that could control blood glucose levels.

The Australian Research Council's Linkage Projects scheme has provided \$310,000 to the research project, with an additional \$120,000 pledged by partner organisation Lupintel.

"This internationally competitive research project could transform the undervalued Australian lupin industry, by providing a new commercial use for the high-protein legume crop, as well as delivering a new and natural treatment for Type 2 diabetes," said Professor Chris Moran, Curtin University Deputy Vice-Chancellor.

The research project will be led by Associate Professor Stuart Johnson, a Food Technologist from the Agriculture and Food discipline of Curtin's School of Molecular and Life Sciences.



### How to make milk seem sweeter

Adding vanilla to sweetened milk tricks the brain into thinking the beverage is sweeter, which could help reduce the added sugar content, new research has found.

Researchers from Penn State conducted a blind taste test which found participants — who did not know vanilla had been added to the milk — consistently indicated that samples with vanilla were significantly sweeter than their added sugar concentrations.

Participants did not rate individual attributes of the milk such as sweetness, intensity of vanilla odour or milk taste, but instead selected the best match for the vanilla milk from four differently sweetened milk choices.

"We are utilising a learned association between an odour and a taste that will allow us to reduce the added sugar content," said Helene Hopfer, Assistant Professor of Food Science. "Reducing added sugar in products, just like reducing fat and salt, is the Holy Grail of food science."

With vanilla, the added sugar content in flavoured milk could potentially be reduced by 20–50%, suggested Gloria Wang, who conducted the research as part of her master's degree thesis in food science.

"We maintain the sweetness perception by having this congruent odour — this learned, associated odour — basically trick the brain into thinking that there is still enough sweetness there," she said. "Based on our results, taste-aroma interaction is a robust effect."

Wang believes the findings offer manufacturers a workable option to reduce added sugar in their products and retain the sweetness consumers demand.

Hopfer's lab will use the concept to develop a reduced-sugar chocolate milk for the National School Lunch Program in a two-year project funded by the National Dairy Council. "We are hoping to utilise what we found with odours to reduce the added sugar content by experimenting to find the sweet spot between cocoa powder, sugar content and vanilla flavour," Hopfer said.

The research was supported by the U.S. Department of Agriculture's National Institute of Food and Agriculture and published in *Food Quality and Preference*.

### Wine industry steps closer to IP protection from copycats

The Australian Government's introduction of the Wine Australia Amendment (Label Directory) Bill 2019 to the Australian Parliament in December is a step forward in the sector's efforts to protect its reputation as a world-class wine producer.

The Bill will enable the development of an Australian Wine Label Intellectual Property Directory, which will allow Australian wine businesses to identify copycat brands and infringements of their intellectual property.

The directory will require all Australian wine exporters to submit images of their labels prior to gaining export approval, and will allow Australian wine businesses and exporters to search for products which may breach their intellectual property. In cases where a business is identified as seeking to imitate a legitimate brand owner's intellectual property, this business could be stripped of their export licence by Wine Australia, in addition to the brand owner taking private legal action.







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# Airborne pathogen removal system



The Baxx Cold Plasma technology from Symetec is designed to eliminate airborne pathogens in food processing and packaging rooms. Suitable for processing areas such as storage, thawing, chilling, processing and packaging, the device can be run 24 h/day and is fully Australian and International HACCP Certified.

While not designed as a replacement for hygienic practices, the Cold Plasma technology does complement these practices to provide a more effective reduction and elimination of dangerous pathogens. It is claimed to provide a less costly alternative to HEPPA or UV, and can complement either if already installed.

Constructed in stainless steel, each small 240 V unit is capable of disinfecting an area of up to 360 m<sup>3</sup>. The system requires no filters or chemicals, and there is no radiation or toxins. As a result, the unit can be placed directly on the wall or ceiling of the food production room (from 2.5 m high) and can operate continuously in all areas of a production facility, whether occupied or not.

## How does it work?

The Baxx patented cold plasma technology eliminates bacteria, virus, moulds and fungus by disrupting the metabolism of their cell walls. Using no toxins, chemicals or radiation, the system works by reproducing the natural occurrence of airborne hydroxyl clusters as found in high altitudes and sunny conditions.

A hydroxyl is a water molecule (H<sub>2</sub>O) missing one of its hydrogen atoms, and because it's in an unbalanced state, it seeks to replace its missing hydrogen atom. These hydroxyl (OH) molecules are attracted to single-celled organisms in the air and on surfaces, attach to them and forcibly rip a hydrogen atom from the cell wall. They are now H<sub>2</sub>O again — harmless water molecules. In the meantime, the cell wall of the organism has been ruptured and, like a popped balloon, it dies. This is a very simple mechanical action. Bacteria and virus cannot become immune to it.

Further, the hydroxyl is indiscriminate on what bacteria and virus it chooses, attacking all equally.

These chemical groups have an added benefit of reacting with and neutralising harmful and odorous gases such as ammonia, methane, nitrogen monoxide and acetaldehyde and converting them into carbon dioxide, nitrogen and water.

## Has it been tested?

Along with Australian and International HACCP Certification, the technology has been tested by the independent and accredited UK laboratory SGS. In a room of 28 m<sup>2</sup> at 27°C, the system reduced bacteria levels by 81.1 to 99.9% within 90 min, and viral traces were reduced by 88.96%. Tests were carried out on rice placed in a high-humidity environment for one week and it was found that when it was held in a Baxx protected area, mould growth and spore production was completely eliminated. It was also found that the system was capable of reducing ammonia levels from 100% saturation down to zero in 30 min. Without Baxx intervention the levels were only 48% over the same time period.

Whole selections of microbes were effectively eliminated by the system including *E. coli*, *Staphylococcus aureus*, *Listeria monocytogenes*, *Pseudomonas*, *Campylobacter*, *Bacillus subtilis*, *Salmonella* and *Saccharomyces cerevisiae*.

## Where has it been used?

The technology has been used in a number of food applications, including small goods manufacturing; lettuce leaf washing and packing to kill *Listeria*; game meat facility boning rooms; yoghurt cooking and rapid cooling rooms; meat wholesalers; chicken meat processing plants; flour mill storage rooms to eliminate flour moulds; seafood processing plants; and cold storage rooms.

It also has other industry applications such as hospital, aged care, veterinarian, medical centres, animal breeding centres and even offices.

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# Full steam ahead

A patented Steam Infusion cooking technology has helped Australian food manufacturer PM Fresh grow its high-quality sauce business. This is the first installation of the technology in Australia following the announcement of the partnership between OAL and Process Plant Network (PPN) in early 2019.

**A** proudly Australian, privately owned company, PM Fresh specified multiple Steam Infusion Vaction Pumps to support production following a new contract win to make fresh chilled sauces. The company needed cooking technology that could increase production capacity within its existing facility while maintaining the high standard of product that its customers had come to expect.

While other technologies were considered, PM Fresh deemed steam infusion a superior process, as it met the company's requirements by enabling the production of quality products without any burn-on contamination. With a complicated full line refit, the installation was completed successfully in coordination with PPN and other component suppliers to meet the tight timeline for their new product launch. In addition, OAL's development chef flew in from the UK to support with recipe development and commissioning of the Steam Infusion system.

## What were the challenges?

At the end of 2018, PM Fresh began to reassess its existing system capability following a new contract win to supply

fresh sauces under licence for a global brand. PM Fresh was facing three key challenges:

**Production capacity:** The existing steam jacketed cooking kettles in the facility couldn't meet the cooking throughput required. A single batch of sauce was taking over 120 minutes to cook because the steam jackets had to be run at a lower temperature to maintain the quality of heat-sensitive products, resulting in time and volume constraints.

**Product quality:** This was of the highest importance to both PM Fresh's customer and the end consumer. PM Fresh needed to remove the risk of burn-on and quality issues, particularly with delicate cream-based sauces, while still increasing production throughput.

**Timescales:** As is often the case in the fast-paced food industry, a solution was needed fast: within 10 weeks!

Given these challenges, PM Fresh's key objectives were to bring cooking times to under 60 minutes on all of their recipes to increase production capacity and deliver burn-free soups and sauces to ensure that their customer was happy with the product quality — all by the tight deadline set by their customer.

### What was the solution?

Following a review period assessing Steam Infusion against other technologies, PM Fresh came to the conclusion that Steam Infusion was the best solution to meet their objectives thanks to a number of unique advantages that the cooking technology can bring.

The Steam Infusion processing environment adds more energy into products faster as steam is condensed into the product within the Vaction Pump ensuring an efficient energy transfer, cutting cooking times compared to steam jacketed vessels.

The gentle way in which Steam Infusion cooks products, despite the high velocity of the steam, ensures that heat-sensitive products are protected during cooking. The Steam Infusion Vaction Pump cooks from the centre of the vessel with no direct contact surfaces for liquid products to burn on to. What's more, the partial vacuum vapour phase, coupled with the short residence times, prevents exposure to excess high temperatures, eliminating burn-on contamination.

With on-the-ground support from OAL, the team managed to meet the product launch date. OAL's processing experts designed the system while PPN retrofitted the Steam Infusion cooking lances into multiple cooking vessels, as well as installing the recipe control system and steam supply to

complete the project. OAL Development Chef Chris Brooks flew out to Australia to support the installation and assist the PM Fresh team in the development of their recipes so they could optimise the results that Steam Infusion achieves, giving the team confidence to develop future recipes independently.

### Key results

Working closely with PM Fresh, OAL and PPN were able to more than double the cooking capacity of existing vessels by reducing cooking times by over 50% and decreasing the cleaning requirements thanks to the lack of burn-on on the vessels. Product quality has not only been maintained, but even improved due to the enhancements that Steam Infusion can bring, meeting another one of the customer's key objectives.

Bill Ryan, Trade Marketing Manager at PM Fresh, commented, "Given the time constraints, we relied heavily on the expertise provided by OAL to meet both the product specifications and the hard launch date. It was our pleasure to work with Chris Brooks, who came all the way from the UK, and we appreciate the crucial role of OAL in helping our business to achieve a successful product launch."

For more information, visit: <https://steaminfusion.oalgroup.com/>.

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## Egg pasteuriser

Established in 1976, heat transfer expert Teralba Industries continues to expand its range of Australian designed and made pasteurisers and heat exchangers system with its latest Thermpro pasteuriser for eggs.

The Thermpro Egg Pasteurising system has continuous heating, cooling and regeneration. The pasteuriser uses unique Dimple profile heat transfer tubing which achieves very high heat transfer co-efficients, which in turn minimises the size or footprint of the pasteuriser.

Teralba Industries has manufactured the complete pasteuriser control system in-house, with Accu-Therm plate heat exchanger, Dimpled Tube Heat Exchanger and a 9-minute hold tube. The complete skid-mounted pasteuriser is supplied AFT tested and ready for connection to product and services, with minimal downtime for installation.

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## Stainless steel vacuum ejectors

The SMC ZH-X267 stainless steel vacuum ejectors are suitable for food, packaging and pharmaceutical environments with rigorous requirements when it comes to washdown and temperature while reducing energy consumption. With a T design that allows exhaust to be piped away, the device is suitable for workpieces with droplets or splashes of water, mixing and blending inert gases and cleanroom environments.

The single-stage ejector with no moving parts has grease-free and corrosion-resistant materials, which is claimed to ensure a long service life even under operating temperatures of up to 260°C.

Other features include the direct mounting and quick and easy connections, with 1/8" threads. It's also available in various nozzle diameters from 0.5 to 1.0 mm and two vacuum levels to allow for the design of a flexible and efficient vacuum system.

With energy-saving benefits, the compact and robust single-stage ejector creates high suction flows of up to 34 LPM while remaining air efficient. It is designed to save on maintenance and replacement cost as it will allow for some level of particles to pass through the ejector without clogging, minimising maintenance or downtime.

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### Turbidity measurement device

The optek Haze Control 4000 is a microprocessor-based converter, with a modular design engineered for high-precision haze (turbidity) measurements. The menu-based software is designed to be easy to use and configure, and is available in various languages.

The software includes adjustable signal damping, 16 linearisation tables and calculation capabilities. An integrated data logger captures process information for quality assurance and plant control records. The data can also be transferred to a PC via an RS232 port.

The converter's photometric converter is designed to operate with the optek DTF16 (11°/90° scattered light sensor) and with AF16 or AS16, visible (VIS) or near-infrared (NIR) based sensors. The graphic display can show absorbance, turbidity and concentration in real-time and in varying units of measure, including EBC, FTU, ppm (DE), NTU, ASBC and Helms. These measurements can be displayed as text, bar graphs, or trend values, with a factory zero point implemented for the scattered light sensors.

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## Forming & Portioning machinery

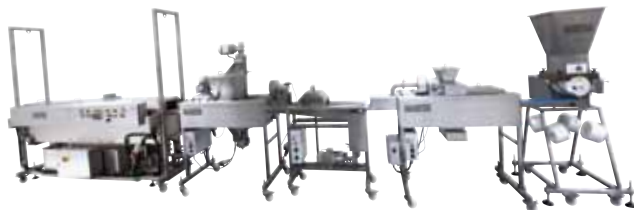
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# Process heat users — listen up!

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**Industry accounts for about 40% of Australia's energy use and, of that, more than 50% is used to produce process heat. The Australian Renewable Energy Agency (ARENA) has released a report that outlines renewable energy options for all Australian industrial users of process heat. For the food and beverage sector, the report says that all renewable energy options are worth consideration.**

**T**he comprehensive report 'Renewable Energy Options for Industrial Process Heat' shows there are myriad opportunities for industrial users to switch to renewable energy alternatives to provide process heat. The report considers all industries ranging from alumina and metals processing, ammonia, iron and steel, cement and lime, pulp and paper, oil and gas, and food and beverage manufacturing.

While bioenergy and onsite solar PV have been popular renewable energy sources for the food and beverage sector, the report said other options worth considering include solar thermal and geothermal or even a combination of various options using electrical heating systems.

ARENA CEO Darren Miller said: "This report identifies that shifting to renewable energy to generate process heat is possible for these sites over the short, medium and long term using numerous technologies and approaches including bioenergy, geothermal, electrification, hydrogen and solar thermal together

with process redesign, combining heat and power and co-locating greenfield developments with renewable resources."

Process re-design, combined heat and power and co-locating greenfield developments to leverage off renewable resources offer potential for overall least cost solutions, the report found.

"Using renewable energy to generate process heat could displace up to 56 petajoules of gas per annum — enough to power a million average Australian homes for a year — within five years, which is significant in light of current supply conditions," Miller said.

Across Australia, industrial sites that use process heat collectively use about 628 petajoules of fossil fuel heating per annum.

The report was produced by ITP Thermal in conjunction with Pitt&Sherry, Institute for Sustainable Futures and Beyond Zero Emissions.

The ITP report shows that the level of industrial experience with using renewable heat is low and barriers include a low appetite for risk and expectations of short payback times. In contrast, a key driver to increase the uptake of renewable energy is the visibility of relevant case studies.

ARENA recently launched its new Investment Plan that set about supporting industry to reduce emissions as one of three investment priorities. It has previously supported a range of projects that support industry to reduce emissions through bioenergy, electrification, hybrid renewable energy solutions combining solar or wind and storage and renewable hydrogen. Recently, ARENA announced support for the Australian Alliance for Energy Productivity (A2EP) to investigate opportunities for using renewables in process heating in food and beverage manufacturing.

To download the report and find out more, visit: <https://arena.gov.au/knowledge-bank/>.

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# Minimising risks of dairy product contamination

**R**ecent outbreaks of *Listeria monocytogenes* in ice-cream in the US have been linked to contamination of the final product in the food-processing environment. Historical control measures through heat (pasteurisation) have had a major impact on reducing the occurrence of listeriosis, but contamination of processed dairy products still occurs. More understanding of ecological niches within dairy manufacturing plants is needed.

The International Dairy Federation has now published guidance outlining additional actions that can be taken in the production process to minimise the risk of *Listeria* contamination in dairy products.

Between 1985 and 2019, there have been 40 confirmed major recorded outbreaks of listeriosis associated with commercially pasteurised dairy products. In most cases where a source was identified, *L. monocytogenes* was found in niches in the dairy processing environment and contamination of final product occurred due to cross-contamination post pasteurisation.

In order to further minimise risk of *Listeria* contamination in the dairy production process, IDF

has developed its new Bulletin 'Ecology of *Listeria* spp. and *Listeria monocytogenes* - Significance in Dairy Production'. The Bulletin summarises risk areas and measures that should be taken in the food production process to minimise the risk of *L. monocytogenes* contamination in dairy products.

François Bourdichon, main author of the publication and present Chair of the IDF Standing Committee on Microbiological Hygiene, said: "Effective management and hazard analysis within the dairy processing environment can minimise the likelihood of contamination with *L. monocytogenes*, therefore giving better food safety assurance."

Recent advances in source tracking can help characterise resident strains, their resistance to cleaning agents and adherence to dairy product contact surfaces. Control measures can be customised for a better fit for purpose, with better hygienic design and a good rationale for the use of chemical cleaning agents.

Good milking practices reduce the prevalence of *L. monocytogenes* in processed dairy, while pasteurisation reduces the contamination (if any) of processed milk with *L. monocytogenes*. Process environment monitoring guards against re-contamination.

## USING INDUSTRIAL ULTRASONIC CLEANERS IN YOUR FACILITY

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### Safety and Environment

Implementing ultrasonic cleaning technology removes manual cleaning, safety hazards and creates a safer, more environmentally friendly work environment.

### Increased Cleanliness

Ultrasonic technology has the capacity to reach into components on a microscopic level, cleaning even small or complex applications where a cleaning brush might not reach.

### Protection and Longevity

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## Long radius stainless steel bends

The Global Stainless patented, double-curved, metal forming process provides a good alternative to traditional segmented bends. The company fabricates long sweeping bends up to 500 mm in diameter, which provides a good alternative to segmented bends, commonly known as 'lobster back' bends. Long radius bends are commonly used for production of milk powder, cheese, chocolate, wineries, breweries, powdered soap flakes and delicate food process conveying, such as the potato chip industry.

The long radius bends offer smoother quieter flow, less back pressure in the conveying of product, which results in less product damage. The other main advantage is that the weld seams on these bends run the length of the bend, as opposed to a segmented bend, so that there is an important self-cleaning advantage, as food product is not able to get trapped, allowing for good hygiene. The weld seams are high-quality, full-penetration, smooth food-grade welds.

The bends are uniformly finished by acid-dipping or polishing to the user's specifications. The company can manufacture long radius bends from 5, 6, 8, 10, 12 inches through to 500 mm O.D. with thicknesses up to 3 mm, made from type 304 or 316 stainless steel. It also rolls stainless steel tube from 1- to 4-inch diameter down to a radius of 600 mm. Plastic rollers are used for the 4-inch tube, so no scuff marks are made on the tube during the rolling process.

Global Stainless has installed bends in many food and dairy factories throughout New Zealand, and is now exporting its bends.

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# Processing pretzels

## with precision

Pretzels are one of the fastest growing segments in the savoury snacks category in Egypt, and is expected to achieve a CAGR of 5.8% during 2016–2020. To maximise the opportunities in this flourishing sector, Egyptian snack manufacturer Future Foods decided to invest in delivering a high-quality pretzel snack range.

Future Foods required equipment to optimise seasoning application, capitalise on packaging efficiency and minimise waste to ensure the successful launch of its new pretzel range. Collaborating with tna to install a seasoning, processing and packaging line has helped the company achieve 100% productivity at high speeds of up to 165 bags per minute (BPM).

### Precise seasoning control

Gaining consumer acceptance at the very first bite is vital when launching any new product. Future Foods needed to feel confident that its new product range would meet consumer expectations to ensure repeat purchase and gain a foothold in the market. In addition, application accuracy was a key consideration for the snack manufacturer. Applying an incorrect level of seasoning can have a significant impact on both input costs in terms of raw materials and wastage costs from rejected products that are either over- or under-seasoned.



Opting for seasoning technology featuring a responsive variable mass seasoning mechanism with dynamic vibratory weigher, the tna intelli-flav OMS 5, Future Foods can precisely control seasoning application within the drum. This enables an accurate, proportional amount of seasoning to be evenly applied to the product for consistent coverage and flavour dispersion, meeting the need for a high-quality, evenly seasoned end product.

George Soussou, Vice-Chairman & Operations Director at Future Foods, commented: "As we produce a delicate product that is new to the market, we had to make sure we deliver a consistently seasoned, great tasting product to appeal to the consumer. tna helped us efficiently spray our seasoning powders with zero waste. This is ultimately why our snacks taste better than those of the competition. With the new seasoning system our powder consumption never exceeds 5%."

Further performance benefits are achieved through the enhanced position of the scarfplate on the tna intelli-flav OMS 5 infeed. Mounted to the edge of the drum, the scarf better directs the product into the spraying and flavouring area, providing an even amount of seasoning on each pretzel. Additionally, the scalloped infeed conveyor design allows more product to enter the seasoning drum, while also helping to control product direction for greater seasoning accuracy and reduced waste. This helped Future Foods achieve cost savings and increase profitability.

### Smooth product transfer

When it came to choosing a distribution system for the new range, minimising product breakage and ease of cleaning were critical factors. From the start, Future Foods knew reducing the risk of potential product damage or loss of flavour was key for success. For this reason, the company opted for equipment that aided a gentle transfer.

The chosen distribution system, the tna roflo HM 3 horizontal motion conveyor, ensures a smooth product transfer through the line, while keeping product damages to a minimum, as there is no vertical lifting or bouncing of the product and no flavour build-up in the pan.

Unlike traditional conveyors that use mechanical gates, the patented 'true' gateless design of the tna roflo HM 3 helps protect the pretzels from damage with servo controlled 'virtual gates' that simply open up a gap between the pans where the product is discharged. The risk of any potential damage to the product is significantly reduced and practically eliminates any loss of flavour. With the installation of several tna systems, including the tna roflo HM 3 and tna intelli-flav OMS 5, breakage level from seasoning to packaging is less than 0.5%.

tna's roflo conveyors also offer significant maintenance benefits due to their overall mechanical simplicity, resulting in greater equipment reliability and therefore lower total cost of ownership over the lifespan of the system. The tna roflo HM is claimed to be the only conveyor in the world that uses a single linear servo motor. One of the main benefits of this design is that there is almost zero maintenance as there are no big drives, shafts, belts or pulleys.



### High-speed, efficient packaging

Offering a new range of pretzels in 16, 35 and 100 g pillow-style bags, Future Foods was looking for a system that would deliver consistently high speeds. Beyond this, quick changeovers to maximise throughput and reduce downtime were also a necessity.

With the installation of two tna robag FX 3ci vertical form, fill and seal (VFFS) packaging systems, the production line offers flexibility and improved performance in a compact, easy-to-clean set-up. With their rotary double jaws, the new baggers were quickly able to deliver speeds of up to 165 BPM, while quick-release formers ensure that Future Foods is able to change between bag sizes in less than three minutes.

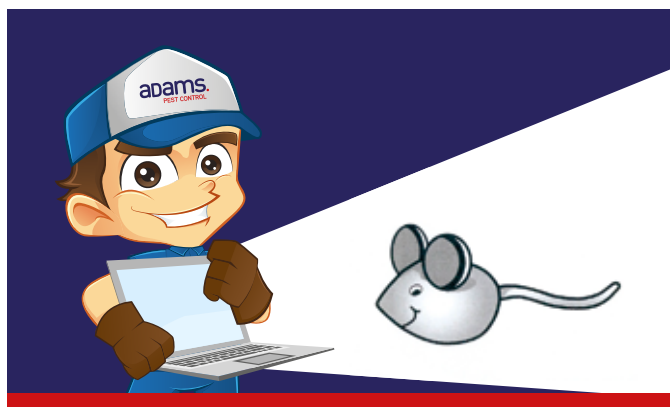
Soussou added: "The new packaging systems are very reliable, achieving 100% productivity at very high speeds. What's more, with less than 1% film waste, we're able to achieve significant cost savings. Adding to that, the user-friendliness of the machine and the ease of changeover between bag sizes keeps downtime to a minimum, further increasing our production efficiencies."

"It's not just the products tna offers. The tna team was always on hand to support and train our team members throughout the entire commissioning, installation and start-up phase. That way, tna ensured that our new equipment always operates at its maximum level of performance. For us, tna is much more than just a supplier, as a true partner, its turnkey solutions make production line equipment virtually carefree and put any company on the road to success."

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## Do you want to brew beer that lasts longer?

Unlike wine, which generally improves with time, beer does not age well. Within a year of bottling, beer tends to get that unpleasant papery or cardboard-like flavour commonly described as 'stale'.

Now, researchers reporting in the American Chemical Society's *Journal of Agricultural and Food Chemistry* have engineered lager yeast to make more molecules that protect beer against staling, resulting in improved flavour stability.

Scientists have linked stale beer flavours to aldehyde compounds, such as (E)-2-nonenal and acetaldehyde. Many of these compounds are produced by yeast during fermentation, and chemical reactions during beer storage can increase their levels.

Brewers have tried different approaches to reduce levels of these compounds, such as controlling the fermentation conditions or adding antioxidants, but staling remains a problem for the beer industry.

That's why Qi Li and colleagues wanted to genetically modify lager yeast to produce more of a molecule called NADH. Extra NADH could boost the activities of natural yeast enzymes that change aldehydes into other types of compounds that don't contribute to a stale flavour, the researchers reasoned.

The researchers used a genetic technique called 'overexpression', in which they artificially increased the levels of various genes related to NADH production.

With this method, they identified four genes that, when overexpressed, increased NADH levels.

The team found that beer from the overexpressing yeast contained 26.3 to 47.3% less acetaldehyde than control beer, as well as decreased levels of other aldehydes. In addition, the modified strains produced more sulfur dioxide, a natural antioxidant that also helps reduce staling. Other flavour components were marginally changed.

The researchers said this approach could be useful for improving the flavour stability and prolonging the shelf life of beer.



## Food-grade touch screen computer display

Interworld Electronics has released the FABS-121PH Food-Grade Stainless Steel Projected Capacitive Touch Screen computer display.

The FABS-121PH is housed in a fanless aluminium enclosure with a 304 or optional 316 grade stainless steel bezel that provides IP66/IP69K front panel protection. Part of the FABS Series, the unit has been optimised to meet the hygienic design requirements of DIN EN 1672-2 and DIN 42115, Part 2. These European standards establish extremely high standards for food and beverage processing equipment.

The unit is a full HD 21.5" 1920x1080 resolution LCD with a 7H anti-scratch highly durable Projected Capacitive Touch Screen making it suitable for operator panel and HMI control applications.

It features a 1000 cd/m<sup>2</sup> high brightness sunlight readable LCD screen and is suitable for agricultural application where exposure to direct sunlight may occur. For indoor processing facilities, the unit is available with a standard 250 cd/m<sup>2</sup> LCD panel. If a touch screen is not required, it can also be supplied with a plain glass protective screen.

The FABS-121PH supports DC 9~36 V power input and an operating temperature range of 0~50°C. The unit is only 60 mm deep. Panel and VESA mounting make the FAB Series convenient to install.

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## Valve clusters and multiport-based manifolds

In the food, bioengineering and pharmaceutical industries, numerous fluids used for different formulations must be precisely dosed. In the process, high hygiene standards and the relevant directives must be adhered to. Compact, modular valve clusters comprising proven assemblies simplify the process of planning and converting plants — as do the patented multiport valves and complex, multiport-based manifolds supplied by Bürkert Fluid Control Systems. These virtually cavity-free assemblies are cost-efficient in operation because the time required for cleaning and sterilisation work, for instance, is reduced.

In order to respond flexibly to individual customer requirements, Bürkert has a range of different valve solutions that are then combined to create the finished valve cluster. These are designed to minimise the volume of dead space. At the same time, the modular valve bodies provide maximum flexibility because the most varied functions can be integrated into the bodies depending on the processing variant. This ensures greater dosing precision based on defined volumes, the elimination of media cross-contamination thanks to reproducible cleaning results, enhanced plant availability due to shorter cleaning times combined with reduced operating costs based on savings achieved in the provision, preparation and disposal of cleaning media. What's more, the individual components already have the necessary certificates of conformity (FDA, 1935/2004, etc) to ensure prompt validation of the overall system.

Multiport valves and complex, multiport-based manifolds such as the Robolux valve solution can meet the stringent requirements imposed by separation processes or be used to maintain sterile process conditions. Based on diaphragm valve technology and offering independent switching functions for two processes per body, the valves use a single diaphragm and just one actuating drive. As a result, they take up approximately 40% less space compared with conventional valve manifolds and are claimed to be simpler to sterilise. Robolux valves can now also be combined with the control heads from the ELEMENT series. This opens up new possibilities for decentral automation of production sequences in the hygiene sector. The control head performs all pneumatic adjustment and feedback functions. Bus communication for the process valves is also integrated.

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## Digital cloud-based services platform

EcoStruxure Machine Advisor is a digital cloud-based services platform designed to enable machine builders to provide digital services to machine operators for each installed machine in any production site worldwide.

Users can connect to any machine worldwide, and machine builders, system integrators and end users can now support the machine operator by creating the optimum framework conditions for reliable machine operation.

Machine Advisor offers functionality for localising and tracking machines and assigning data for documentation and machine history, as well as collecting and visualising operational machine data. Users can be better informed of anomalies, due to cloud analytics and notifications.

Machine performance can be monitored with individual dashboards, and cloud-based software tools enable troubleshooting and health checks on the machines.

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## Food-safe industrial lubricant

Food recalls due to contaminants cost food and beverage companies millions each year and also cause reputational damage, potentially affecting future sales. Switching to high-quality food-grade oils in all machines that could come into contact with food or beverages could reduce the risk of product recalls.



Adhering to the international standards set out by NSF, a US-based company that developed a system to grade lubricants, could minimise the risk of product recalls caused by contamination from lubricants that are not food-grade. The NSF standards recognise the different uses for lubricants and split them into three categories. H1 is for lubricants that might come into incidental contact with food, H2 is for those that will not come into contact with food, while H3 is for edible oils used on grills, hooks, trolleys etc.

Industrial lubricant specialist NCH provides lubricants that are both effective and food-grade to international standards. The range of NCH products includes those for specific uses, such as the Threaze Ultra, an anti-seize lubricant that can work at temperatures up to 1260°C, yet is safe to use where incidental food contact is likely. Another NCH product, Premalube, is a heavy-duty, high-temperature grease that is formulated to solve food processing equipment problems and meets international standards including AQIS, NZ MAF, FDA, USDA and NSF.

Businesses manufacturing food and beverages require food-safe lubricants that don't wash away with water, melt away with heat, dissipate with pressure or degrade with dirt or dust particles. Unsuitable lubricants can cause contamination, wear and tear, and machinery breakdowns, which can negatively impact businesses. Using the right industrial lubricant can provide many advantages for food and beverage manufacturers.

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## Food-grade air circulators

Fanquip's stainless steel air circulators meet the temperature and control requirements of industrial companies looking to maintain better working conditions for staff. The stainless steel and the hosing aspect lends a long lifespan to the product, allowing it to lower the temperature of a site without compromising hygiene standards, while also decreasing condensation with air movement.

The product comes with stainless steel guards, motors and brackets, providing rustproofing and cleanliness. Other components of the product are made of inert plastic, to eliminate risk of contamination to products it is working around.

Available blade diameters include 460, 630 and 810 mm. The technology is rated as IP56 (for 240 V) and IP69 (for 415 V) hose proof, allowing the operator to wash down the equipment at regular intervals without damaging it.

The product can be relocated and repositioned to where it is most

effective; its stainless steel features minimise the risk of contamination in sensitive industries such as the food production sector.

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## CASE STUDY

### Water injection automation in coffee production



Controlling and measuring exact amounts of condiments, spices and ingredients directly determines important quality factors in the food industry, such as consistency, flavour and processing times. During its manufacturing process, coffee should be roasted in specific temperature ranges, with its taste and quality connected to its moisture content.

Group Instrumentation was asked by a coffee producer to supply a measurement system that could monitor moisture levels in coffee after the final roaster. During this process, to ensure the optimum taste it is essential to keep good moisture characteristics for conveying until the packing process. The coffee producer required a moisture range between 3.5–5% and functionality to control water injection into the roaster.

#### The solution

The M-Sens 2 continuously measures up to 65% of moisture content in materials conveyed on different devices, such as screw feeders,

conveyor belts, slides and more. The M-Sens 2 monitors the moisture levels of coffee grains by controlling injection into the roaster. Measuring the moisture makes it possible to determine when and how much water should be injected into the final coffee roaster. After the automatic control, the manufacturing process becomes more reliable due to online measurement that updates a new set point for the water injection lines when a change in moisture content is detected. By automating and monitoring the water injection in coffee production, coffee producers can determine a fixed moisture range for their products, between 3.5 and 5%.

The M-Sens 2 provides online control of the water injection and allows users to avoid missing moisture changes in their product by measuring moisture levels through the coffee beans.



Group Instrumentation Pty Ltd  
[www.groupinstrumentation.com.au](http://www.groupinstrumentation.com.au)

### Cool solution for renewable refrigeration

Glaciem Cooling Technologies and the University of South Australia have been developing a low-cost thermal energy storage technology that will store and discharge energy using a heat transfer process. This occurs at a temperature suited to the specific application using special material.

The technology has the added benefit of using natural refrigerants rather than commonly used synthetic refrigerants which can be harmful to the environment. It uses an advanced control and forecasting system to optimise the system's operation based on weather forecasts, electricity price forecasts and customer demand forecasts to optimise the storage system to maximise customer savings.

The Australian Renewable Energy Agency (ARENA) recently announced \$2 million in funding to Glaciem to demonstrate the technical and economic value of integrating thermal energy storage with renewable energy into HVAC&R applications.



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FLUID CONTROL SYSTEMS

# Early-warning system for milk supply contaminants

A 5-minute test that provides an early warning of contaminants in the milk supply chain has been developed by a team of European researchers. The test could also be used in beer or water processing applications.



**D**espite high standards of food safety and quality in the dairy industry, there is still the possibility that traces of impurities and contaminants could find their way into milk. For example, udder infections can lead to harmful organisms entering the milk, and chemical substances such as antibiotics or pesticides can contaminate the product via fodder or as a result of inadequate control of equipment and storage facilities.

As part of an EU-funded project called MOLOKO, Fraunhofer researchers have teamed up with 12 partners from seven countries to develop an optoplasmonic sensor designed to provide fast, on-site analysis of safety and quality parameters for milk.

The aim is to use the biosensor at various points along the value chain — both as a lab device and directly installed in dairy equipment. It could also be suitable for testing the quality of liquids other than milk, such as beer or water.

Taking just 5 minutes, the sensor is used to analyse the product for a total of six parameters relating to contaminants and proteins, thereby providing a supplementary check and an early-warning system within the supply chain, well before the milk is pumped into the tanker. The sensor is functionalised with receptors for specific antibodies that serve as indicators of various quality and safety parameters for milk.

The entire system consists of a re-usable microfluidic chip, organic light-emitting transistors (OLETs) or diodes (OLEDs), a sensor comprising organic photodetectors (OPDs), a nanostructured plasmonic grating and the specific antibodies. The organic photodetector is undergoing development at the Fraunhofer Institute for Organic Electronics, Electron Beam and Plasma Technology FEP, and the microfluidic chip at the Fraunhofer Institute for Electronic Nano Systems ENAS. The OLET, meanwhile, is being developed by CNR-ISMN in Bologna, and the photonic grating by the company Plasmore Srl in Pavia, both

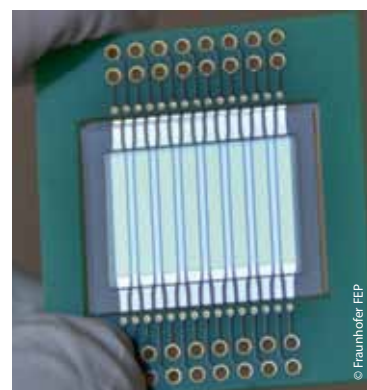
in Italy. Coordinator of the project is CNR-ISMN.

“The unique thing about our chip is that it can be re-used,” explained Andreas Morschhauser, researcher at Fraunhofer ENAS. “The target molecules are stripped from the immobilised antibodies by a regenerating buffer. This means that the antibodies can be re-used for further tests.” In fact, the estimated life of the chip is 100 test cycles.

In addition to supplying information on milk safety and quality, the measured parameters also reveal details about the health and condition of each cow. This can help farmers spot infections in their cows at an early stage and begin treatment immediately.

## How does it work?

Dr Michael Törker, a researcher at Fraunhofer FEP, explained: “Light emitted by the transistor falls onto a grating coated with antibodies specific to the various substances being tested for. When milk is flushed over the grating, any target molecules in the milk then bond with the antibodies. This alters the refractive index in the immediate vicinity of the grating, which in turn modifies how this light is reflected. The reflected light is registered by the photodetector, which measures minimal changes in the refractive index.” This basic phenomenon, which occurs on specially structured nanogratings, is known as surface plasmon resonance. It provides rapid and highly sensitive readings.





*Freeze-dried bacteria using nitrogen freezing from GEA.*

Image credit: GEA.

# Nitrogen freezer pilot plant

## for live bacteria used in dairy products

Many dairy and food processors, as well as suppliers of probiotic products, use live bacteria as part of their production process (eg, yoghurt or cheese). Traditionally, they have kept their own strains of bacteria and transferred them from one batch to the next.

However, as more specialised strains of bacteria have emerged, so too has the need to distribute them more widely. This is typically done by freezing them to -50°C and then storing them under temperature-controlled conditions until they are required. This, however, requires a continuous cold chain.

For this reason, freeze-dried bacteria have become popular because it can be transported and stored at ambient temperature and rehydrated as required. On the other hand, freeze-drying bacteria is a long process requiring several hours to freeze, then an additional 48 to 72 hours for the lyophilisation process to be completed; this ties up expensive freeze-drying equipment and limits production.

GEA has now launched its nitrogen freezing pilot plant for bacteria which takes a different approach, freezing the bacteria in droplets using a liquid nitrogen bath outside the freeze dryer then drying the pellets via the normal procedure. By freezing bacteria into pellets before drying, food processors are said to be provided with greater flexibility, a higher active cell count and reduced costs through better use of their fermentation lines and freeze dryers.

Other benefits include: rather than freezing all of the bacteria in a single batch, it can be collected from a continuous stream; fermentation and freeze-drying are separate, so the freeze dryer does not need to be available when the product is frozen: bacteria can be stored at -50°C until it is required; the bacteria cell count resulting from this process is nearly double that of traditional freeze-drying techniques; and frozen pellets dry much quicker than bacteria in slab form, so the lyophilisation process is also faster — typically 24 to 36 hours compared to up to 72 hours.

“Although there is a cost for the liquid nitrogen, this is more than offset by the optimised utilisation of the freeze dryer,” explained Morten Pedersen, Area Sales Manager for GEA Process Engineering. “Freeze dryers are expensive, so we need to make sure customers are getting the best possible output from them.”

Regarding the higher cell count from this technique, Morten stated, “Bacteria that is frozen quickly via liquid nitrogen and dried in this way is retaining twice as many viable cells than other techniques. This product is more effective than other options and ultimately reduces the customer’s costs.”

The GEA nitrogen freezer pilot plant has a simple design, is easy to use and can be cleaned in place. Trials can be organised for food and dairy processors to test the technology in their own plants.

The pilot plant will be on display at the Food Ingredients Europe Exhibition in Paris from 3–5 December 2019.

*GEA liquid nitrogen freezer pilot plant.*

Image credit: GEA.



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## Corrugated-tube heat exchangers benefit Yorkshire dairy

A UK-based dairy has improved production of its local delicacy, Yorkshire Curd, by installing two HRS corrugated tube heat exchangers.

Located near the picturesque North Yorkshire village of Holmfirth, Longley Farm is one of the UK's primary producers of Yorkshire Curd. Originally developed by Yorkshire farmers as a tasty way of using up any curds left over from cheese making, the uncooked fresh curd product is the key ingredient in a traditional Yorkshire curd tart. Today, this sweet pastry-cased delicacy filled with currants and egg is often served as a cold treat or a warm dessert.

While most dairies make curds and whey by adding bacteria to the milk to turn the lactose into lactic acid and stimulate the proteins to stick together, for Yorkshire Curd production, Longley Farm adds acid directly to the milk.

However, this traditional method creates very small curds, which get mixed into the whey portion. Particulates form, and traditional plate heat exchangers can easily become blocked. For this reason Longley Farm has chosen corrugated tube heat exchangers from HRS as their design prevents fouling

of the tube wall and maintains efficient performance.

### The need for heat exchangers

Like most dairies, the Longley Farm factory operates a number of heat exchangers to remove the heat from processing and manufacturing its dairy products, which must be chilled for sale. Most of these are of a traditional plate design, which is fine for simple heating or cooling purposes, but recent upgrades to the machinery which produces fresh cream and Yorkshire Curd have seen new corrugated tube-type heat exchangers installed.

Although the initial capital costs of tubular heat exchangers are higher than the simpler plate alternative, over the course of their operational life they can prove to be much more economical, improving process efficiencies by re-using heat and helping to maintain the quality of the end product.

These tubular units overcome some of the limitations of plate heat exchangers, such as the relatively high pump pressures required, while also reducing maintenance costs over the life of the unit.

"We have a number of HRS heat exchangers which are integral to our operation in a number of ways," explained Longley Farm Operations & Technical Manager Konrad Schwoch. "We use what we would consider a standard heat exchanger for cooling processes, but we now have two more sophisticated systems from HRS."

### Benefits of corrugated tubes

The new HRS heat exchangers incorporate corrugated tubes which provide a number of advantages over flat plate or smooth tube types. The biggest advantage is that heat transfer is increased, particularly at higher flow rates, meaning that less heat transfer area is required, resulting in a shorter, more

compact design, together with associated cost savings.

This also results in gentler handling of the product during the cooling phase, which is crucial for fresh cream production. "For a cream process we want the cooling profile to be very gentle and we want to agitate the cream as little as possible," said Konrad. "That was the main reason for using a tubular heat exchanger as it is gentler on the cream and improves product quality." As he points out, if you 'beat up' cream, for example by pumping it over and over, you make butter, which is specifically not what is required in this situation. Maintaining the ideal temperature of the cream throughout the process is also vital for maintaining the quality of the finished product, which also facilitates its handling in the factory.

Corrugated tube heat exchangers have a lower pumping requirement than other tube-type heat exchangers as their compact nature results in a lower pressure drop during the heat exchange process. This helps contribute to the long operational life and reduced maintenance of the unit, which has advantages for Longley Farm.

"We buy equipment that we hope is going to last," commented Konrad. "Therefore the cost and downtime associated with maintenance is a key consideration. You want to make sure that you've bought something that is reliable, doesn't need a lot of maintenance, isn't hard to look after, is good value for money and lasts a long time. For me, the value in the tube-type heat exchanger is that it is a more robust piece of equipment. It's harder to break and easier and cheaper to service, saving money over the lifespan of the unit."

Like all HRS heat exchangers, the corrugated tube units are made from high-quality stainless steel which Konrad finds appealing: "Because of the innovation you get from HRS, such as multi-tubes and annular spaces, you have a lot more surface area than a traditional tubular heat exchanger. Because of this, and because they have a number of different designs and different applications, the actual size of the new system is smaller than the old equipment it is replacing, making it easier to incorporate into the factory layout."

## A different design is required for curd production

The new heat exchanger chosen to improve Yorkshire Curd production is a different design to that used for cream. This time a corrugated tube design which specifically



increased turbulence was chosen to help to reduce fouling inside the tubes.

While most dairies make curds and whey by adding bacteria to the milk to turn the lactose into lactic acid and stimulate the proteins to stick together, for Yorkshire Curd production, Longley Farm adds acid directly to the milk, which is the traditional way of making the product.

"Using this traditional method creates a problem when you want to heat or cool the solution," explained Konrad. "The curd can be very, very small, so when you are pumping it you get curd mixed into the whey portion. When you want to pump it you know you are going to get particulates in it, so we need to use a corrugated tube heat exchanger because traditional plate heat exchangers can easily become blocked with the small bits of curd. It's much easier and cheaper to use a corrugated tube heat exchanger in the long run."

This unit has been specifically designed by HRS to handle these particulates, even if they reach levels well in excess of those found in normal operation. "Even if things go wrong and there is a lot of curd in the system, which shouldn't happen, the system won't become blocked or get damaged," added Konrad. This confidence that the unit will not need unblocking, together with its robust design and ease of servicing, mean that it is not necessary to access the new heat exchanger as frequently as its predecessor. Consequently it has been installed on a platform 3 m above the factory floor.

## Energy recovery

A further benefit of HRS heat exchangers is their energy-recovery capabilities. The heat recovered from the cooling process for the

Yorkshire Curd is used to warm water which is then transferred to the farm cottages across the road from the factory. The warm water is used to provide heating and hot water to the cottages and, although this is the first time that such an energy efficient scheme has been implemented on the farm, it has been so successful that the new tube heat exchanger on the cream line will soon be connected to the system.

"There's an advantage to us in recapturing this heat," explained Konrad. "While it adds another level of complexity to the overall process, in some places we want to heat products and then in other places cool them again, so efficiency is very important overall." He also praised the level of understanding that HRS has shown when it comes to Longley Farm's complex requirements: "Although we cool our products with heat exchangers, we also need to use a chilled water system to take out the last bit of heat in order to reach the chilled temperature required by our finished products. That's a relatively complex process compared to some other situations, so we need to work with a company that we know understands that and that we can trust to deliver."

"With all our different requirements, including heating and cooling, it can be difficult to automate quite a complex group of processes and not end up with the biggest, most complicated plant in the world. The clever thing has been keeping the heat exchanger solution simple while providing everything we need."



HRS Heat Exchangers Australia New Zealand  
[www.hrs-heatexchangers.com/au/](http://www.hrs-heatexchangers.com/au/)





## Standardisation analyser for protein and fat in dairy products

Tetra Pak and milk analysis experts FOSS have launched an advanced version of the Tetra Pak Standardization unit. With continuous measurement and control of protein and fat in dairy products, the unit is designed to help users achieve consistent product quality by removing the uncertainty of sampling techniques.

The solution uses automation hardware and software algorithms that react and adjust in real time, offering good ratio performance. The system provides key data every seven seconds, enabling quicker reaction times to achieve high product quality.

Suitable for cheese and milk powder production, benefits include: advanced performance for fat to protein ratios; uniform and on-specification product quality; eliminates the uncertainty associated with manual sampling.

Integrating Tetra Pak's propriety software algorithm and the FOSS analyser in the Tetra Pak Standardization units with continuous protein control results in an advanced solution for inline measurement and control.

Another benefit of analytic software within the standardisation units is the ability to test a number of components directly, eliminating the need for manual testing.

**Tetra Pak Marketing Pty Ltd**

[www.tetrapak.com/au](http://www.tetrapak.com/au)



## Oxygen absorber film form format

The Mitsubishi AGELESS oxygen absorber technology is designed to protect food's freshness and flavour. It protects against colour change, prevents mould growth, maintains nutrition, protects aroma and prevents oxidation of fats and oils.

Designed to improve the shelf life for products, the AGELESS technology has been in the style of a sachet for many years but the technology is now also available in a film form OMAC version.

The film format is designed to be suitable for pouches and lidding, and is available for retort laminate as well as hot fill specification. Instead of having a sachet to be placed in a package, the AGELESS OMAC makes the package itself the absorber.

The AGELESS OMAC oxygen absorber technology can be used with moist products such as baked goods all the way up to liquid-based soups and sauces.

Metalprint is the distributor for AGELESS products in Oceania.

**Metalprint Australia Pty Ltd**

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## Food pathogen testing

The Thermo Scientific SureTect System is designed to quickly and accurately detect foodborne pathogens in a broad range of foods.

The SureTect PCR assays are now validated to run on the Applied Biosystems SimpliAmp Thermal Cycler and Applied Biosystems QuantStudio 5 Food Safety System, which means a streamlined workflow that requires fewer touch-points. Built on proven PCR technology and backed by service and support, the SureTect System is designed to quickly and accurately detect foodborne pathogens in a broad range of foods following the AOAC accredited workflow.

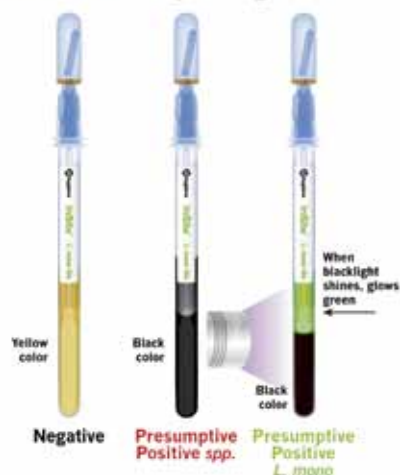
The Applied Biosystems QuantStudio 5 Food Safety Instrument is a high-performance benchtop food pathogen detection system. The platform gives users greater control of data and combines out-of-the box installation, ease of use and system connectivity with powerful options to enable maximum control. The system is also claimed to provide faster reporting compared to traditional culture- and ELISA-based methods for pathogen detection.

The system provides simple and streamlined workflows that use a single same-day or overnight enrichment step, direct lysis protocol for DNA release and universal cycling parameters for pathogen detection.

**Thermo Fisher Scientific**

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### InSite: Interpreting Results



### Swab test for dual detection of *Listeria monocytogenes* and species

InSite L. mono Glo is a single, safe and self-contained swab system for the simultaneous detection of *Listeria* species and *Listeria monocytogenes*. The results are read visually, and *Listeria* can be detected in as little as 24 hours without the need for subculturing or further steps, eliminating cross-contamination risks.

An effective environmental monitoring program is the first line of defence to protect final product from *Listeria* contamination. Detecting down to less than 10 colony forming units of *Listeria*, the swab test enables users to monitor their environment with confidence.

InSite L. mono Glo is claimed to be more economical than outsource testing and *Listeria* contamination is detected days earlier, to allow for corrective action sooner, minimising the risk to finished product. The device uses a 5 cm sponge swab to maximise the recovery of *Listeria* from surfaces. The all-in-one device is designed to eliminate cross-contamination risks and avoid the need for separate sponges, diluents, bags and pipettes.

The device is easy to use — simply swab, snap and squeeze, incubate and read using the naked eye. A media colour change from yellow/amber to grey/black indicates a presumptive positive result for *Listeria* species. Samples presumptive for *Listeria* species that exhibit green fluorescence under ultraviolet light indicates a presumptive positive result for *Listeria monocytogenes*. No expensive equipment is required.

This is an AOAC-RI Performance Tested Method.

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# AmazeBalls: cheesy snack development

Australian dairy business Ashgrove has developed its AmazeBalls natural cheese snack using a Radiant Energy Vacuum Dehydration (REV) technology.



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**A**shgrove is a family-owned dairy business located in Elizabeth Town, Tasmania. Several generations of Bennett families have been farming the land surrounding the milk and cheese factory since the 1880s. In 1993, the Ashgrove Cheese factory was built nearby and its first vat of cheese was produced on 29 November 1993.

The company is always striving to innovate its products, especially when it comes to cheese. Given that natural snacking was on trend, in 2017, the company started using a new processing technology to make its dehydrated cheese snack called AmazeBalls. According to the company, the cheese snack is designed to provide protein and nutrients in an easy-to-eat dairy format.

## How is the product processed?

During the product development, Ashgrove evaluated various conventional freeze dryers but decided against this technology as it used too much water. While searching the internet for

alternative technology, it came across the Canadian company EnWave, which had developed a Radiant Energy Vacuum Dehydration (REV) technology that could be used to make a clean-label dehydrated cheese snack product.

The REV technology is a rapid, low-temperature drying method that is designed to maintain the product's colour, flavour and nutrients during the drying process. While the technology was new for the Australian market, it proved to be suitable for Ashgrove's product due to the fast processing speeds in conjunction with minimal use of water.

EnWave's patented vacuum-microwave technology enables uniform drying with flexible moisture content that is claimed to be unattainable with freeze drying or air drying. Ashgrove was keen to be the first to use it in Australia for cheese.

The uniform drying method allows for a range of final moisture percentages and the ability to create shelf-stable products at various moisture percentages. The machines provide scalability with options from research and design, batch production to continuous commercial production.

The nutraREV drum-based machine tumbles the product in rotating drums, moving through the vacuum microwave chamber, as the microwave energy is used to homogeneously dehydrate the product to a desired residual moisture content. It is suitable for the dehydration of organic materials that can be tumbled without breaking, typically discrete pieces of food. Many fruits, vegetables, meat products, dairy products, spices, herbs and grains are suitable for the process.

The Ashgrove Tasmanian Farm Amaze Balls are available in a variety of flavours, including Havarti, Tasty Cheddar and even Salted Caramel, across Australia.



## Bulk material sweeping system

The AirSweep material flow system is designed to ensure the flow and prevent blockages of bulk materials in silos, bins, hoppers and chutes. Manufactured from high-grade steel, the system is suitable for a range of materials such as brewers grain, chocolate, grains, flour, hops, meal, oat hulls, rice bran, salts, starch and sugar.

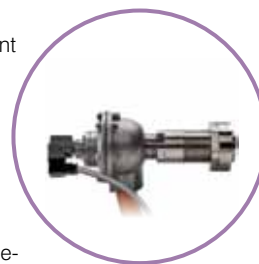
Each nozzle directs a high-pressure/high-volume, 360° burst of compressed air or gas between the material and vessel wall to lift and sweep stagnated material back into the flow stream. Up to 2.4 m diameter of material is activated with each pulse from the nozzle, without damage, vibration, stress or wear to container walls. The system's patented valve design uses one moving part, ensuring immediate reseal after each pulse of the nozzle to prevent clogging and material build-up.

Features include: reducing time- and labour-intensive hammering, rodding and shutdowns for vessel clean-out; reducing flushing/cleaning time between product runs; improving batch uniformity; and easy cleaning and maintenance due to the system being mounted on the outside of the vessel.

Suitable for a range of industries including food processing, feed and grain, aggregate and mining, pharmaceutical processing, and chemical processing, the system can eliminate bridging, ratholes and build-up. It can be easily installed on metal, concrete, wood or fibreglass units.

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## CASE STUDY

### Aseptic PET line for liquid dairy manufacturer



Known for its chocolate milk drink, Yotvata Dairy by Strauss Group in Israel manufactures extended shelf life (ESL) white milk in PET bottles. The company recently redesigned the packaging format of its 2 L ESL milk bottle from HDPE to PET and installed a second aseptic complete PET line from Sidel.

Despite having only 8.5 million inhabitants, Israel was ranked 15<sup>th</sup> globally for per capita spend on dairy in 2016. Many of the country's dairy producers are bottling their products in HDPE and carton. Therefore, Yotvata's adaptation of PET provides a point of difference in the market.

PET was chosen as a packaging alternative by the company due to various design possibilities for the bottle, alongside its lightweighting potential and recyclability qualities. PET can also provide environmental benefits in the form of lower transport costs and reduction of raw material use.

Founded in 1962 and located in a kibbutz in the heart of the desert, approximately 40 km north of the Red Sea, Yotvata Dairy has demonstrated — against all odds — the feasibility of milk production under desert conditions. The company has been able to create a variety of rich tastes, including its well-known chocolate milk which has been sold at the small inn at the entrance to the kibbutz since the 1960s.

Long-term business partner Sidel supported Yotvata's redesign of its 2 L PET bottle, helping the producer overcome challenges associated with the packaging size format, while enhancing users' convenience. The design concentrated the material's tightness in the gripping area to minimise the splashing effect when pouring the product into a glass. The bottles also counterbalance the vacuum effect, which may impact products distributed via the cold chain.

Yotvata purchased a second aseptic complete PET line from Sidel, as the technology would allow them to produce UHT and ESL milk in PET bottles. "This new packaging line will allow us to increase the production capacity on existing products while reducing our environmental footprint, mainly due to the switch from HDPE to PET and the bottle lightweighting potential offered by Sidel's integrated dry preform decontamination system," explained Achiraz Horeish, COO at Yotvata.

The PET line currently produces 1- and 2-litre bottles for flavoured, UHT and ESL milk. The PET line features Sidel's Aseptic Combi Predis, complemented by Capdis, combining preform and cap sterilisation, flowing and sealing functions in a single enclosure for a sterile filled and capped PET bottle. The Aseptic Combi Predis does not consume any water and very few chemicals, and allows unlimited bottle lightweighting, which is claimed to have contributed to saving seven billion litres of water and 57,000 tonnes of PET, while producing 46 billion bottles. The blower oven activates the sterilising effect of the hydrogen peroxide vapour without additional heating of the preforms; the same technology is used for cap sterilisation, providing a dry aseptic PET packaging solution.

The line also includes Sidel's RollQuattro, a high-speed roll-fed labeller that can handle lightweight containers with thin labels and conveying and end-of-line equipment. Able to run at 13,500 bottles/hour, the line also includes EvoFilm, a shrink-wrapping system, and a PalKombi, an automatic palletiser suitable for crates, cartons, trays and shrink-wrapped packs, designed for medium- to high-speed lines.

Sidel Oceania Pty Ltd  
[www.sidel.com](http://www.sidel.com)

## Electric power pallet movers

Manual pallet jacks can make significant physical demands on operators in confined areas, particularly when heavy loads have to be pulled or pushed using muscle power alone, which can result in back-related injuries.

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The Mitsubishi PREMIA PBP16-20N2 series has been developed to provide a comprehensive solution to safe horizontal movement of pallets. Changes in technology are always gaining pace, and to stay ahead, Mitsubishi continuously improves the designs and specifications of its products.

The series features a maximum lifting height of 135 mm and has been designed to be suitable for challenging environments. It allows for easy handling on steep ramps and loading docks, even with damaged pallets. A sealed chassis offers protection against dirt, dust and other particles to reduce wear, while an oil-filled sealed transmission is designed to ensure reliable and quiet operation. The trucks also have a high-efficiency electronic system that features waterproof components for maximum reliability.

While initially more costly than hand pallet jacks, electric power pallet movers can provide a safer, cost-effective solution in the long run. With the right equipment specification and operator training, Mitsubishi electric power pallet movers are designed to reduce the risk of operator injury, reduce fatigue, improve operator performance and increase the efficiency of the operation.

Acceleration, top speed and braking characteristics are fully programmable to suit each individual's needs. When the control handle is pulled all the way down or up, the truck automatically stops. Furthermore, when the emergency button is activated the truck immediately stops. For tight turning in confined spaces, the power pallet movers have a unique 'handle-up' operation feature, making them suitable for use in containers and the back of trucks.

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# Level best

## How radar meets measurement needs

Accurate and reliable level measurement is vital in food and beverage manufacturing, but demanding process conditions can make this very difficult. Philip Holland, Business Development Manager at Emerson, explains why non-contacting radar transmitters using frequency modulated continuous wave (FMCW) technology provide a robust level measurement solution.

**F**ood and beverage manufacturers must be able to accurately and reliably measure the level of liquid and solid products contained within the various tanks, silos, hoppers and bins typically used in their storage and production processes. There are many reasons why precise and dependable level measurement is essential in production. These include ensuring consistent product quality, optimising inventory management, and providing protection against tank overfills and pumps running dry, all of which can affect profitability.

However, many food and beverage applications involve challenging process conditions in which level measurement instrumentation must be able to perform seamlessly. These conditions can include large temperature variations, foam, dust, turbulence, condensation and the presence of agitators in vessels.

### Non-contacting radar transmitters

One of the most widely applied technologies that is suitable for the most challenging applications is non-contacting radar transmitters. These devices provide a highly accurate direct measurement of the distance to the surface of liquids, sludges, slurries and solids. A significant advantage of this technology is that its performance is unaffected by process conditions such as density, viscosity, conductivity, coating, corrosiveness, vapours, and changing pressure and temperature. Non-contacting radar transmitters also have no moving parts and do not come

into contact with the product surface, which results in low maintenance requirements and promotes long-term performance and reliability. In addition, their advanced built-in diagnostics capability supports preventive maintenance; their installation and commissioning is very straightforward; and devices can be proof-tested remotely, thereby improving operational efficiency and increasing worker safety.

### Measurement techniques

Non-contacting transmitters perform level measurement using one of two main techniques — either pulse or frequency modulated continuous wave (FMCW). The power/sensitivity of transmitters based on FMCW technology can be more than 30 times higher than in devices using the pulse technique. This maximises their signal strength and enables them to deliver greater measurement accuracy and reliability, even when measuring level in the most challenging environments. The additional sensitivity and measurement reliability provided by FMCW transmitters makes them an ideal solution for a broad range of challenges.

Until recently, a drawback of FMCW technology had been its need for more processing power, which has led to FMCW transmitters typically being deployed only within four-wire devices. This can require additional cable infrastructure, which is both costly and time-consuming. However, the latest FMCW transmitters are more energy-efficient and need only two wires



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for power and communication. This enables simple installation while still providing the same high amount of data and diagnostics that would normally require four-wire connections.

### Ambient temperature

Many food and beverage environments have large variations in ambient temperature, which can impact pulse radar devices as their accuracy is based on reference conditions at 15°C. FMCW transmitters use a crystal oscillator to perform online adjustment of the transmitted frequency, thereby ensuring consistently high accuracy in dynamic ambient temperature conditions.

### Foam

The effect of foam on radar measurement depends largely on the foam's properties, such as its thickness, density and dielectric constant. Microwaves typically pass through dry foam and detect the product surface below, but with wet foam, microwaves are often reflected from the foam surface and thus it is the foam surface level that is measured. The latest FMCW transmitters overcome this problem with a double surface handling function that enables the product surface to be measured rather than the foam layer.

### Dust

In solids and powders applications, large amounts of dust are created during fill cycles, which can pose problems for some

level measurement technologies. Non-contacting radar transmitters usually handle dust well, but the signal can be blocked if there is a heavy layer of dust on the antenna. The latest devices overcome this with an integrated air purging system for cleaning the antenna.

### Agitators, turbulence and condensation

Other process conditions that can impact measurement accuracy are agitators in tanks, turbulence and condensation. A good example of how the latest FMCW devices are able to overcome these challenges can be found at an application in Australia, where a manufacturer required accurate and reliable level measurement in a stainless steel mixing tank containing starch slurry.

The manufacturer had tried using various pulse radar transmitters, but none of them provided an accurate or reliable level measurement. The three-metre-high tank contained agitators for mixing, and these obstructions were causing false signal reflections, making it difficult for the pulse transmitters to detect the true surface level. This resulted in frequent false high-level alarms which interrupted production and a high risk of tank overfills. Further problems were caused by the turbulent liquid surface in the vessel. The turbulence caused the pulse transmitters to sometimes lose individual pulses, causing them to misregister and lock onto the next available pulse, which resulted in inaccurate level measurements. In addition, high amounts of condensation within the tank were causing the pulse transmitters to experience problems with loss of level measurement, again leading to alarms and inaccurate measurements. These inaccuracies were not only proving to be costly, but they also put the pumps in danger of running dry when the devices showed the level to be higher than it really was.

The manufacturer overcame all these challenges by installing an FMCW-based Rosemount 5408 non-contacting radar transmitter from Emerson. FMCW technology allows sophisticated software algorithms for masking and ignoring false signal reflections caused by tank obstructions such as agitators, so that measurement accuracy is unaffected. These algorithms are not possible with pulse transmitters. Measurement errors caused in pulse radars by lost individual pulses cannot occur in FMCW transmitters because of their different measurement technique, thereby increasing their accuracy and reliability. The condensation that affected the pulse transmitters was also not a problem for the FMCW technology, which is generally unaffected by condensation and low-pressure steam. It should be noted that the measurement accuracy of FMCW devices can sometimes be affected by heavy condensation, but in such instances, adding an air purge or selecting the process seal antenna can reduce the negative effects of heavy condensation.

Since being installed, the greater signal sensitivity provided by the Rosemount non-contacting radar transmitter has delivered the accurate and reliable continuous level measurements required by the manufacturer. This has prevented tank overflows and pumps running dry, thereby increasing safety. In addition, there has been no need for downtime to perform pump maintenance or clean-ups, which has increased output considerably.

To learn more about the benefits of non-contacting radar transmitters based on FMCW technology, visit [Emerson.com/rosemount5408](http://Emerson.com/rosemount5408).

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[www.emerson.com/au/automation](http://www.emerson.com/au/automation)





# Perfecting the freezing technique

While many individuals are credited with developing the technique of freezing food, in 1924, Clarence Birdseye invented the quick-freezing method that enables food to be frozen in the way that we know and use today. However, regardless of the type of food being frozen, from meat to exotic fruits, the challenge is always to keep the product fresh and safe for consumers. Darcy Simonis, industry network leader for ABB's food and beverage segment, explains the challenges in the frozen food industry.

Freezing techniques have needed to adapt over time. While freezing food had been possible prior to Birdseye's invention, historical freezing methods were typically slow, meaning that ice crystals would rupture the cell membranes of the food, leaving it undesirable in both texture and taste once thawed.

In order to maintain quality, many food manufacturers look to individually quick-freeze products using industrial freezers, which not only freeze food and keep it fresh, but also make it consumer-friendly. This can be particularly difficult for smaller items, such as individual pieces of fruit or pizza toppings, which can easily collect and freeze in bulk if not processed correctly.

Many manufacturers use industrial freezer processes, such as those supplied by Swedish food freezing experts OctoFrost,

which use bedplates to shake products so that they are individually and separately frozen. While this means that the time to freeze items is reduced as the surface area of the product is much smaller, it also means that products are individually usable either by second-stage manufacturers or consumers alike.

## A chilly business

Frozen food manufacturing is a risky business. With temperatures potentially shifting anywhere between 25 and -30°C, hygiene requirements must be thorough to avoid risk of contamination and to protect public safety. Food manufacturing equipment must be cleaned regularly, often twice daily for some processes. Yet, with certain integral parts, like motors often being supplied with protective paint coatings, which can be subject to deterioration and damage under corrosive washdown conditions, there is potential for contamination issues to arise.

ABB worked closely with OctoFrost to develop a range of colourless motors to supply the industrial freezer range from the Swedish food freezing experts. While these type of motors are traditionally coloured blue, ABB was able to develop and supply unpainted IE2 Process Performance LV fan motors to the entire OctoFrost supply chain, as well as offering the range of colourless fan motors to OctoFrost customers that require replacement parts.

This also means that manufacturers can implement even the most rigorous of washdown procedures and there is no risk of paint flaking off and contaminating the food, at whatever stage of the process.

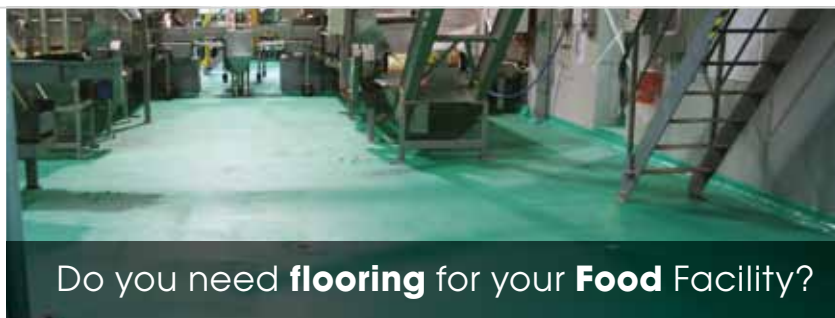
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## Evidence-based pest control service

The Adams Pest Control Electronic Monitoring Service (EMS) provides a targeted data-based approach for proactive pest control that mitigates risk of infestations and reduces use of rodenticide and poisons.

Adams Pest Control has been involved in the development of this evidence-based integrated pest management service over nine years in conjunction with a number of specialist businesses both locally and overseas.

The EMS uses a range of sensors and Narrow Band technology (NBloT) to provide 24/7 monitoring that tracks rodent movement/activity. The sensors track activity along eaves, pipes and suspended ceilings, and waterproof devices with NFC-enabled sensors are used below ground level.

The collected information is used to provide analytical diagrams and heat maps. Traps are placed in identified hot spots such as entry points, and congregation and nesting locations, and these traps are continuously monitored.

The real-time data is supplied directly to a user's dashboard interface to enable rapid response.

Moving from the current reactive approach to pest control to a proactive targeted strategy based on continuous data collection of rodent activity has many benefits, including: mitigating risk of infestations; long-term reduction in rodent population; allowing for quick response and action to reduce the likelihood of negative social media attention; reducing rodenticide use, waste and reliance on poisons; and improving animal welfare compliance.

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# It's a wrap for square bottles

Swiss company Bischofszell Nahrungsmittel (BINA) produces fruit products, ready meals and beverages such as organic juices and iced teas.

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**L**ike many other nations across the globe, Switzerland is currently experiencing a health and wellness surge. One way in which this manifests itself is portion control. To benefit from this trend, while also addressing the busy on-the-go lifestyles of consumers, juice manufacturers are expanding their product offerings by reducing the size of their bottles, thus increasing the portfolio of formats they serve.

BINA wanted to process squared bottles for its juice and iced tea drinks while still running round bottles on the same line, in a compact area of the plant at up to 50 cycles/minute at the shrink-wrapping stage. The company integrated a lean, unifilar 90° infeed system from Sidel in one of its existing shrink wrappers.

"We wanted to package our new juice and iced tea bottles in shrink-wrap film while also having the option of using a tray plus film for some batches — all while keeping the footprint of the solution to a minimum," said Yasin Kapusuzoglu, Project Manager, Technology, at BINA.

This presented a few challenges, as the orientation of squared containers had to be controlled within the whole process to get a pack with correctly facing bottles — resultant, a traditional mass flow infeed system was not feasible. Due to the range of bottle formats — from 250 mL to 2 L — processed on the line, production runs are shorter, necessitating frequent changeovers. Compactness was also a deciding factor.

"The alternative of having a lane divider feeding the traditional channels of the shrink wrapper, consequently avoiding mass accumulation, was not appropriate in terms of the footprint. In fact, the area taken by the divider and its conveyors upstream and downstream would require too



much space while reducing the circulation around the line," said Valérie Cattenoz, Overwrapping Product Manager at Sidel.

After evaluating possible solutions, BINA opted for Sidel's infeed system, as it allowed a compact line layout without jamming at the shrink-wrapper's infeed due to its design. The shrink wrapper is equipped with a compact and reliable unifilar 90° infeed system where the flow is managed on one lane, directly from the sleeving machine. The flow of juice and iced tea bottles instead goes straight to the shrink wrapper.

The reliability of this innovative infeed secures a critical part of the shrink wrapper, enabling the management of any shape of bottle — round or squared. A selecting device with lateral brackets delivers the right number of products per row, while ensuring the necessary distance between each row. These rows are then transferred at a 90° angle by an 'on the fly' pusher, which redirects the flow of three to five bottles in accordance with the shrink wrapper's flow direction.

The installed system could potentially run at a maximum speed of 150 cycles/minute, depending on the product size and shape. The infeed is complemented by a tray module, delivering tray plus film packs. For changeovers, the shrink-wrapping solution featured embedded automatic systems, with operators guided through each step via the HMI. Most of the adjustments are done automatically, while the non-automated machines are supported by LED digital counters.

"We appreciate the simple, streamlined unifilar infeed system where all changeover tasks are carried out automatically in three minutes, delivering a maximum changeover time of 15 minutes for the entire shrink wrapper," Kapusuzoglu said.

To accommodate the need for the tray plus film option, Sidel designed a removable rolling tray magazine, which can be extracted from the shrink wrapper when running a format without tray support. The circulation around the line is consequently simplified for the consumables and the operations. In a traditional solution, the tray magazine is located underneath the product infeed — however, Sidel's 90° infeed configuration makes the upper part of the magazine more accessible, allowing an ergonomic manual refilling of the trays in the magazine.

Sidel Oceania Pty Ltd  
www.sidel.com

what's new in **Food** technology & manufacturing

## packaging & labelling



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- TX600 - 600 dpi printer featuring precise calibration and registration required for printing the smallest labels

All Label Power TX200 series printers feature a large 3.5" color TFT display, 320 x 240 pixels. This makes setting up and using the printers a breeze.

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TX200



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AP550



LX910



AP362

The TX200 Series of thermal transfer desktop barcode printers supports more printing applications than any other printer in its class. With three models available, the four inch wide TX200 Series can address everything from higher volume 4x6 shipping labels, higher resolution product marking and graphic solutions, to high resolution labels used in electronics marking applications.

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# Redesigning your packaging with the 5Rs

*Nerida Kelton, MAIP, Executive Director – Australian Institute of Packaging (AIP);  
ANZ Board Member – World Packaging Organisation (WPO)*



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Mindsets have shifted over the last few years and globally consumers are now actively driving brands and their packaging departments to align their sustainable packaging design to incorporate the 5Rs.

From a consumer perspective, the 5Rs are:

1. **Refuse:** Don't purchase unwanted items.
2. **Reduce:** Eliminate single-use products and packaging wherever possible.
3. **Reuse:** Use products more than once and make use of reusable products such as water bottles, cups and shopping bags.
4. **Recycle:** Make use of recycling bins and purchase products that are recyclable. Look for products using the new Australasian Recycling Label (ARL).
5. **Repurpose:** Purchase products that are made from recycled content.

Packaging technologists are being asked to reconsider the outcomes of their packaging design across the supply chain from manufacturing to recycling. Packaging design can no longer be linear, a closed loop circular approach must be considered.

When discussing the waste hierarchy from a packaging design perspective, Reduce, Reuse and Recycle are the three most important areas for significant and long-term changes — they are the preventive measures with the highest level of impact.

Achievable steps for packaging technologists can include redesigning the shape and size of a product, reducing thickness and weight of materials, shifting to recyclable materials and even developing a closed loop system for products. Any adaptations to the packaging design, structure and form, how-

ever, must not compromise the ultimate purpose of packaging, which is to maintain the ability to protect, preserve, contain, communicate and transport a product all the way to the consumer. Packaging must remain 'fit for purpose' first and foremost before any structural changes are made to a pack. The AIP encourages all packaging teams to undertake a life-cycle assessment where possible before any pack is altered.

Consumers are also driving the focus to what is really happening with packaging at the end of life. Designers can no longer incorporate a mobius loop on pack without asking themselves whether it is actually being recycled or landfilled in the country it is sold in. The answer may then determine a full redesign of their packaging and use of materials. The availability of the APCO Packaging Recycling Evaluation Portal (PREP) enables this decision-making for all packaging technologists and designers, as it reflects the true state of play in the recyclability of all packaging materials in this country.

If the material is capable of being recycled in the country in which it is sold, then consumer waste and GHG emissions will be significantly reduced across the lifespan of the product. Adding 30% recycled content into all of your packaging also ensures that we are moving towards a circular economy and taking responsibility for our own packaging waste. These steps in turn all go towards achieving the 2025 National Packaging Targets that brands are diligently working towards.

An effective redesign feature of packaging that consumers are slowly embracing is Reuse whereby a customer can Refill their products using the same packaging. It is important to note that reusable containers have a greater environmental impact than one that is single use, if not used correctly.

Whenever possible, packaging technologists should try to design packaging for continued use and the ability to have multiple uses for the consumer over an extended period of time. Just like a reusable drink container, the more that a refillable pack can be used over a longer period of time, the less impact the packaging will have on the environment.

Every day more and more companies are announcing refillable packaging solutions including cosmetics, cleaning products and even beverages. The journey to truly sustainable packaging is exciting and we encourage packaging technologists to take this opportunity to reimagine their packaging and actively work to designing better packaging that addresses Reduce, Reuse, Refill and Recycle.

Australian Institute of Packaging  
[www.aipack.com.au](http://www.aipack.com.au)



# Bag it, pack it, wrap it: does packaging reduce food waste?

Independent research released by the Australian Fresh Produce Alliance (AFPA) has highlighted the importance of packaging fresh produce in reducing food waste.

Carried out by RMIT and Empauer, the research indicates that fresh produce packaging can mitigate the \$20 billion of food wasted in Australia every year. The research tracked the life cycle of 10 fresh produce items with and without packaging, with results indicating that packaging provided considerable benefits for fresh produce, including product protection, extension of shelf life and the ability to communicate product information to consumers.

Consumer concerns about packaging relate to the environmental impacts of production and the end-of-life treatment options available for packaging. As the impact of packaging cannot be separated from those of the product, the product-packaging system must be considered as a whole to minimise its overall environmental impact.

"AFPA recognises that consumers are concerned about the level and type of packaging that is used for fresh produce. What this research demonstrates is there are real practical reasons for using packaging for certain types of fresh produce," said Michael Rogers, AFPA CEO.

"It is important that consumers better understand why producers utilise particular packaging formats, whether it be to ensure product integrity in the supply chain, extend shelf life and/or reduce food waste," Rogers said.

The research analysed the effects of packaging on various fruits and vegetables, such as bananas, cucumbers, lettuce and snacking tomatoes. When stored in perforated low-density

polyethylene packaging (LDPE) and high-density polyethylene packaging (HDPE), bananas had an extended shelf life of 36 days, with unpackaged bananas lasting 15 days. Cucumbers that were shrink wrapped and stored at 12°C had a shelf life of nine days, whereas unwrapped cucumbers had a shelf life of two days. Whole heads of lettuce that were sealed in polyethylene plastic bags and refrigerated had a shelf life of 28 days — a 4.5 shelf life difference from loose storage.

Small snack packs of tomatoes in plastic clamshell punnets provided a 28-day shelf life for the tomatoes, providing a marked improvement from earlier cardboard packaging, which absorbed moisture from the tomatoes, dehydrating them and resulting in lower-quality tomatoes.

"The environmental impact of the waste generated from damaged, unsellable fruit actually outweighs the impact of utilising the punnet," Rogers said.

While emphasising the importance of packaging for fresh produce, the report also highlights the importance of reducing environmentally harmful packaging where possible and implementing packaging solutions that can be recycled.

"AFPA members are focused on ensuring all Australians have access to fruit and vegetables as part of a healthy balanced diet and are conscious of meeting this goal in the most sustainable way possible," Rogers said.

'The role of packaging for Australian fresh produce' report and industry summary can be downloaded from the Australian Fresh Produce Alliance website.

# the perfect bite



We put a lot into

this one perfect fry.







## Politicians reject mandatory Health Star Rating system

The Australia and New Zealand Ministerial Forum on Food Regulation (the Forum) met in Christchurch, New Zealand, in November, to discuss a range of food regulation and policy matters. The Forum agreed that the Health Star Rating system should remain voluntary, with options for interim targets in the five-year period to be considered as part of the implementation plan. Ministers considered the Health Star Rating five-year review report and its 10 recommendations for enhancing the Health Star Rating system, and also endorsed a plan to reform the Bi-national Food Regulation System (the System), following a review of the *Food Standards Australia New Zealand Act 1991* (FSANZ Act).

The Forum comprises Australian and New Zealand Ministers responsible for food, and the Australian Local Government Association. Forum Ministers found the Health Star Rating system to be a useful tool to assist consumers in making healthy food choices, and agreed to implement some amendments to the system, as recommended in the review. Forum Ministers also noted that some recommendations in the report would require funding support, with further considerations necessary in the context of an implementation plan.

Ministers noted that the Health Star Rating system is primarily used for processed, packaged multi-ingredient foods, and agreed that a 5 star rating for minimally processed foods such as canned and frozen fruits and vegetables would be beneficial for consumers. Ministers also requested that the Food Regulation Standing Committee (FRSC) provide advice on implementing the rating, with definitions for minimally processed fruits and vegetables.

Forum Ministers decided to modernise the food regulation system by endorsing a plan that will be used to guide reforms to the System, and pursuing new institutional and legislative foundations for the System. The Forum also noted that governments, industry, consumers and public health advocates in both countries will be engaged in this reform process.

Some stakeholders raised concerns about the labelling and naming of plant-based alternatives to animal-derived products, which may be misleading to consumers, while others considered these products beneficial to consumers and the economy. The Forum discussed how plant-based 'milk' and 'meat' products could be referred to in the Australia New Zealand Food Standards Code. Ministers agreed that both the alternative products sector and the meat and dairy sector have a place in the market for consumers, as both add value to the Australian and New Zealand diet and economy.

Ministers felt that synthetic or laboratory-based products, as opposed to animals raised on a farm, are trading on the intellectual properties of primary producers and appealing to the unconscious values consumers ascribe to natural products like dairy and meat. Ministers also requested that the FRSC provide technical advice about edible oils (and how they are treated under the System) in early 2020.

Ministers took into account the measures taken by the European Union and the United States of America to protect the intellectual property of producers, particularly dairy and meat, and asked FRSC for its consideration of regulatory and labelling issues relating to these foods. Through this, the Ministers intend to develop a policy guideline to differentiate 'synthetic' animal products from their natural or conventional equivalents.

The Forum's response paper will be published on the Food Regulation website, with the next Forum meeting scheduled to be held in early 2020.

Food Standards Australia ANZ  
[www.foodstandards.gov.au](http://www.foodstandards.gov.au)

## Resealable, sustainable packaging

The Slicefresh cardboard trays are thin with increased rigidity that facilitates ease of printing on both surface for vertical visibility on the supermarket shelf. The packaging also uses 80% less plastic, with the laminated barrier on the cardboard tray separated for recycling at the end of life use.

The packaging features resealable plastic or foil top seal, to keep contents securely in place while maintaining freshness and reducing food waste. The resealable packages also increase consumer convenience.

The product can run on different Trave sealers by changing tools, and is recommended for packaging sliced meat, fish and cheese. The packaging also offers 360° branding and communication on every surface, with high-quality graphics to display a product's branding design. The product also offers flexibility on the communications format, for printing and labelling.

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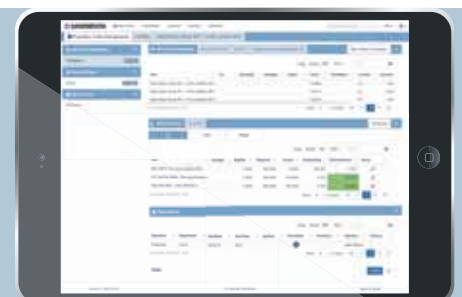
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### Tetra Pak launches fully traceable sugarcane packaging

Tetra Pak, along with its supplier Braskem, has introduced packaging made from responsibly sourced plant-based polymers using the Bonsucro standards for sustainable sugar cane. The announcement forms part of the company's Planet Positive initiative.

"We've seen a growing trend of consumers wanting to do more for the planet, and they look to brands to help. Today 91% of consumers look for environmental logos when shopping, and Bonsucro Chain of Custody Certification can be used to communicate credible information to consumers, thereby helping our customers differentiate their products," said Mario Abreu, VP Sustainability at Tetra Pak.

Through its collaboration with Braskem, Tetra Pak strives to develop a package that contributes to a low-carbon circular economy, made entirely from plant-based or recycled materials, fully recyclable, without compromising on food safety. Plant-based polymer supplier Braskem has also reached 100% certified volumes of sugarcane-derived bioethanol for plant-based solutions, establishing full supply chain transparency.

"Our plant-based polymers are fully traceable to their sugarcane origin. We see plant-based materials as playing a key role in achieving a low-carbon circular economy. In the future all polymers we use will either be made from plant-based materials or from post-consumption recycled food grades," Abreu said.

Gustavo Sergi, Renewable Business Unit Leader at Braskem, said: "We have been working with Tetra Pak for more than 10 years, and Bonsucro Chain of Custody reinforces the Responsible Ethanol Sourcing Program from Braskem with the assurance and traceability of the entire sugarcane value chain, all the way back to the growers and mills."

Danielle Morley, CEO of Bonsucro, said: "Working with Tetra Pak to achieve third-party certification and product labelling of their sugarcane-derived packaging is a milestone. We are very excited to continue to support responsible sourcing and for the contribution that certified sustainable sugar cane can make to plant-based packaging."

### Form-fill-seal machines

The Alfa Machine Thermo Form-Fill-Seal (FFS) Machines are suitable for processing cups/tubs with label, cups with IML, cups/tubs without label, mini-portions and special shaped containers.

The machine range extends from low-production machines suitable for single portions up to high-output machinery appropriate for every cup shape or size.

The custom-built FFS units can work with any type of product such as liquid, semi-viscous, pastry, etc. The FFS machines are characterised by their ease to use, high yield rate and low cost per produced cup.

Features include: easier transportation and management of raw materials; low packaging costs compared to pre-made containers, improved hygiene and easier controlled conditions; preheating base material at 150°C; product filling under controlled conditions (Hepa filters); UV or H<sub>2</sub>O<sub>2</sub> technology for sterilisation; accurate label application; and high efficiency packaging lines up to 95%.

The packaging materials incorporate a key role in the properties of the packaging and during the first stage they are determined by the need for safe products at the desired shelf life. The machinery is suitable for processing a broad range of packaging base material such as PS, PET, PVC, PP, PLA, and multilayer materials; lid material: Alu, Alu-PET, Mix-Pap and more as well as Banderole label (IML); and paper with hot-melt lacquer or BOPP pre-cut label.

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# Guide to barcoding and pallet labels

Do you know your EAN-13 barcode from your SSCC pallet label? If not, Matthews Australasia could help with its free online barcoding and labelling training tools. The online tools are aimed at supporting Australian manufacturers who supply products to any of the major supermarkets.

**T**he centrepiece tool is the Barcode Learning Centre, which has been developed in collaboration with GS1 Australia. It features information about each of the required barcode and label types used by the industry in Australia from consumer unit, carton and pallet level standards.

Matthews has had over four decades of experience in product coding, labelling, automatic data capture and inspection. According to Mark Dingley, Matthews' CEO, the range of barcode tools and resources has been designed specifically to support manufacturers supplying to any of the major Australian supermarkets, including Woolworths, Coles, Aldi and Metcash. For small or medium-sized businesses, it can be challenging to keep relevant staff up to date across the range of guidelines existing within the industry.

"Talking about barcode compliance with many of our customers, it became obvious that there was a significant opportunity to assist with improving education levels in a clear and easy-to-understand format in conjunction with GS1 Australia and the major retailers," said Dingley.

"The data tells us that the number one cause for supplier rejects at supermarket distribution centres is errors relating to SSCC pallet labels. Using the tools and resources we have launched in



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PACKAGING & LABELLING

November 2019 has the potential to save the entire downstream supply chain, from manufacturer to distribution centre, millions of dollars nationally by improving efficiency and compliance."

Andrew Steele, Retail Account Director for GS1 Australasia, added: "GS1 Australia is proud to have worked alongside Matthews in the development of their online Barcode Learning Centre, which we see as an invaluable tool to assist companies in understanding the fundamentals of how to produce quality barcodes that will scan first time, every time."

In addition to the free tools and resources launched in November, Matthews also has a complete package code management software solution called iDSnet platform. It is designed to assist manufacturers to ensure the right code is always applied to the right product.

Matthews Australasia Pty Ltd  
[www.mathews.com.au](http://www.mathews.com.au)

## Take your brand beyond the box with Zip360®

The wide-mouth opening of the Zip360® resealable pouch, created by a 360-degree perimeter zipper around the package, provides easy access to contents. Zip360® allows for neat in store shelf presence and convenient home storage – it's a package as innovative as the product.

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## Packaging solutions for bakery and biscuits

From a simple horizontal single lane flow wrapping unit to a complete fully integrated high-capacity packaging line, CT Pack has the engineering skills and experience to provide efficient and user-friendly solutions. A specialist in food packaging with a focus on bakery, chocolate, ice-cream and frozen food, CT Pack can provide full turnkey packaging lines starting from the individual unwrapped product and continuing all the way to case packing.

Esko Australia in collaboration with CT Pack can offer high-efficiency naked product feeding and buffer systems, horizontal flow wrappers and secondary packaging solutions for the bakery and biscuit Industry in Australia and New Zealand with dedicated local post-sales support.

The diverse solutions available include:

**Feeding/buffer systems:** Alignment system that can be fed manually directly from moulds or automatically with matrices coming from the production line; products turning device to turn the products 90° from a broad edge leading position to a narrow edge leading orientation; phasing system to create and dispose of an accumulation of products without any contact between them; cross feeding station to distribute multiple incoming product rows into required packaging line downstream; LiFO Buffer and FiFO Buffer.

**Primary packaging:** Flow wrap machine — single lane — up to 120 m/min cold sealing and 60 m/min heat sealing; and Flow wrap machine — double lane — up to 240 m/min cold sealing and 120 m/min heat sealing.

**Secondary Packaging:** Case packer — Box erector (forms the box and closes the bottom), product handling, collating, top-loading pick and place, box closing and sealing; Boxing system — forms, fills and seal boxes from a flat blank; Cartoning machine — up to 300 cartons/min; Delta robot — pick and place, top-loading multi-pack, tray/box/ case loading.

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## Label printers and applicators

Label Power Primera colour label printers and label applicators are designed to make in-house label production easy.

Users can print full-colour labels on paper and synthetic label stocks with matt and gloss finishes. The labels can then be applied to bottles and packages using the company's easy-to-use label applicators.

Printing colour labels and tags is easy with Label Power's colour label printers. Models range from the entry-level Primera LX500 to the wide-body Primera LX910 on-demand full-colour label printer.

The Primera LX910 features the ability to print in both dye-based colour inks (for bright vibrant colours) and durable pigment-based inks (for lightfastness and durability).

The Primera LX500 and LX910 will work with Windows and MAC software.

Once the labels are printed they can be applied quickly and easily with the Primera AP550 for boxes and packages or the AP362 for all bottles and cylindrical containers.

**Label Power Pty Ltd**

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# Seizing the Singaporean export opportunity

**Singapore imports nearly 90% of its food, making it a massive market opportunity for Australian food and beverage businesses looking to export. Rod Arenas, General Manager of Commercial for Food Innovation Australia Limited (FIAL), explains how businesses can ensure they are tapping into this potential.**

The export opportunity Singapore represents stems from it being home to an extremely sophisticated consumer class, one that continues to demand an ever-broadening range of food and beverage products. Singapore is looked to within Southeast Asia as being the benchmark for trends and quality, increasingly so as the broader region continues to grow economically. This, combined with improved logistics throughout the region, has seen Singapore become a major trading and distribution hub for food and beverage products. In fact, between 20 to 25% of all imported food is re-exported across the region.

Currently, Australia exports AU\$1.2 billion worth of food and beverage products to Singapore each year. While this is certainly sizeable, Arenas believes this figure is not what it could be. Particularly when you consider the number of competitive advantages Australian food and beverage products enjoy. These include a proximity and natural affinity with the region, as well as a strong reputation for having 'clean and green' products due to high food safety standards.

"Singapore is a massive market opportunity for Australian food and beverage companies. Yet, many businesses are not capitalising on it," said Arenas. "This is something we are actively working on with industry to change."

## Have an export plan

FIAL is an industry-led, not-for-profit that grows the share of Australian food in the global marketplace by supporting businesses to enter into new export markets.

"We've found that many businesses are very daunted by the prospect of exporting, not knowing where to start," said Arenas. "This is where we recommend coming along to one of our export readiness workshops."

Held all around the country, the FIAL export readiness workshops have been designed to help Australian food and agribusinesses build a world-class export plan. Businesses benefit directly from in-market representatives, buyers, lawyers, and Australian food businesses already successfully exporting to the region. Award-winning health food manufacturer, Morlife, credits these workshops as being central to the start of its export journey.

"I was new in the export role at Morlife and FIAL's workshop was fantastic. By the end of it, I had already shaped an informed export plan. I still reflect on it today, years later," said Morlife Export and Business Development Manager, Cheryl Stewart.

## Make connections

Once an export plan has been developed, getting their products in front of buyers is the next big hurdle for businesses. This is where Austrade

recommends attending an international tradeshow as an invaluable starting point. Held biennially, Singapore hosts the region's most important tradeshow, FHA-Food & Beverage.

Occurring at the end of March, FIAL will yet again be taking a team of Australian delegates to FHA-Food & Beverage 2020. These food and beverage businesses will benefit from showcasing their products on the 'Australia' stand. FIAL is unique in the full suite of services it provides to ensure those businesses joining it at tradeshows get the most value out of the trip. All freight and customs requirements are managed, and businesses receive market intelligence and introductions to key buyers during the complimentary Market Insights and Retail Tour. Many Australian food and agribusinesses have successfully negotiated and secured their first orders into Singapore as a result of attending FHA-Food & Beverage with FIAL.

Arenas encourages food producers and manufacturers to draw upon the support provided by FIAL to seize the Singaporean export opportunity.

For more information, visit [www.fial.com.au](http://www.fial.com.au).



Food Innovation Australia <sup>Ltd</sup>

Food Innovation Australia Limited  
[www.fial.com.au](http://www.fial.com.au)





## Egg white replacement system for plant-based meat

DuPont Nutrition & Biosciences has launched naturally sourced GRINDSTED PLANT-TEX egg white replacement system for plant-based meat alternatives. It is suitable for anyone wanting to reduce their consumption of meat.

The PLANT-TEX MA1201 for burger patties boosts protein content for health profiling and improves the taste of the final product, including juiciness and umami flavour, providing the meat-like texture and juice-bite in burgers and meatballs.

The PLANT-TEX MA1301 for cooked sausages provides good shape maintenance and meat-like 'snappy' bite of cooked sausages, regardless of being hot or cold.

The PLANT-TEX MA1110 for cold cuts allows for vegan deli ham with an authentic taste and texture.

It is cholesterol and allergen free and has no ingredients of animal origin. It increases food safety by natural elimination of risk of bird flu or *Salmonella*.

**DuPont Nutrition & Biosciences**

[www.dupontnutritionandhealth.com](http://www.dupontnutritionandhealth.com)

## pH test strips for food testing



PEHANON is a test strip designed for measuring pH in coloured samples. Both the pH indicator and the reference colour chart are unified onto one test strip, so any colour within the sample has the same effect on both the reference colours and the reactive pad.

The test strips do not require a separate colour chart, saving time for workers in production. They also have a built-in hydrophobic barrier to prevent migration of the sample toward the user's fingers, making the product safe to use and free from contamination.

It's important, for food safety, to monitor pH levels to prevent the growth of harmful microorganisms in food and beverage. pH is also crucial for the development of flavour; for example, the lower the pH, the more sour the taste.

Suitable for testing pH in coloured samples such as soft drinks, sauces and wine, the test strips are designed and manufactured in Germany by Macherey-Nagel. There are 14 different measuring ranges available. Each pack contains 200 test strips with a shelf life of 3 years from date of manufacture.

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## Best-practice yoghurt guidelines

Tetra Pak has launched best-practice guidelines for yoghurt products — a suite

of services which are designed to support a variety of yoghurt innovations.

The guidelines support the design of customised solutions for five types of yoghurt products: stirred, set, drinking, concentrated and ambient. Specific sets of guidance can be tailored to match the production needs of different types of yoghurt.

Using expertise gathered from more than 300 yoghurt equipment installations worldwide, the guidelines have been developed to help users reach a level of 'yoghurt fluency' which can enable growth.

**Tetra Pak Marketing Pty Ltd**

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## Simple taste test

Scientists at the Leibniz-Institute for Food Systems Biology, located within the Technical University of Munich (TUM), have developed a new methodology for the simultaneous analysis of odorants and tastants, which they believe could simplify and accelerate the quality control of food in the future.

Whether a food tastes good or not is essentially determined by the interaction of odours and tastants. A few trillionths of a gram per kilogram of food is enough to perceive some odorants; tastants, on the other hand, are only recognised at significantly higher concentrations.

In order to guarantee consistent sensory quality, it is important for manufacturers to know and control the characteristic odour and taste profiles of their products from the raw material to the finished product. This requires a fast but precise food analysis.

"We have now developed a new, innovative methodical approach that will enable us to examine food simultaneously for both odorants and tastants in a time-saving, high-throughput process," said Thomas Hofmann, Director of the Leibniz-Institute for Food Systems Biology. "It is based on an ultrahigh-performance liquid chromatography-mass spectrometry (UHPLC-MS) method typically used for taste analysis."

Volatile odorous substances can now be analysed by means of an upstream enrichment or substance conversion step using this



*The simultaneous analysis of odorants and tastants could simplify and accelerate the quality control of food in the future.*

method, which is otherwise not used for aromatic substances.

"We have tested our new methodological approach using apple juice as an example," said Andreas Dunkel, Senior Scientist at the Leibniz-Institute of Food Systems Biology. "The results are very promising."

According to the scientists, the new method makes it possible for the first time to analyse a large number of samples in a very short time with regard to their taste- and odour-giving ingredients. The researchers hope to be able to further develop the method so that it can be used by food manufacturers in the future to quickly and easily monitor the flavour of food along the entire value chain and, if necessary, optimise it.

Last but not least, the new method could also be used to stop food fraud. Dunkel said, "Using the identified flavour profiles, it would be possible to check the origin and quality label of the manufacturers and detect food fraud."

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# Researchers reveal the secret to creamy melted chocolate

The smooth versus grainy texture of a piece of chocolate can be due to the amount of open space within the chocolate at the microscopic level, which could change how it melts on the tongue. Smooth creamy chocolate is achieved through a process called tempering, where the chocolate mixture is repeatedly heated and cooled. Improper tempering can result in a grainy mouthfeel, with the particles appearing different on examination. For food manufacturers tempering vast quantities of chocolate, it is vital to understand how that process can affect the taste of chocolate.

Scientists from the University of Guelph at the Advanced Photon Source (APS) located at the U.S. Department of Energy's (DOE) Argonne National Laboratory have used an X-ray machine to discover the properties of chocolate's microstructure that provide a pleasing mouthfeel.

Researcher Fernanda Peyronel used a technique called ultra-small-angle X-ray scattering (USAXS) to investigate a property called fractal dimension, a feature of the geometric configuration of tiny particles of chocolate. Researchers were trying to determine whether these particles have a more open or closed structure, correlating that to the mouthfeel experienced by consumers.

The USAXS instrument provides a unique view into the characteristics of chocolate and other materials, as X-ray scattering allows researchers to study a larger volume of material simultaneously, instead of relying on detailed information about a few particles. The X-ray scattering process provides a statistically averaged picture of a much larger region.

"When you're talking about a chocolate manufacturer that is tempering tons and tons of chocolate, knowing how that process is affecting how the chocolate tastes is very important," Peyronel said.

Developing a better understanding of the tempering process could lead to major energy and cost savings, as the process requires a considerable amount of time and energy. Previous food science research using the USAXS technique focused on other edible fats, such as cocoa butter. By analysing chocolate as a multi-ingredient matrix containing cocoa butter, cocoa powder, sugar and an emulsifier such as lecithin, researchers hope to develop a greater insight into the relationship between chocolate microstructure and mouthfeel.

"Some chocolate makers want to replace some of the cocoa butter, because this edible fat is quite expensive. However, it's unclear how the cocoa butter affects the microstructure," Peyronel said.

While the atomic and molecular structures of chocolate are well known, they are not what consumers experience in their mouths. Instead, a key indicator that has been used to characterise a good chocolate is called a polymorph. The best polymorph, according to researchers, is called  $\beta_v$  (beta-5), with a configuration in which the atoms are at their energetic minima.

Researchers are now trying to create a  $\beta_v$  polymorph in chocolate that is stable, lending pleasant mouthfeel.

The research was funded by the Natural Sciences and Engineering Research Council of Canada.



## Will 2020 be the year of inulin?

Demand for inulin has increased, with the number of products launched that feature inulin doubling between 2012 and 2019.

The prebiotic fibre inulin is increasing in popularity among consumers as it is claimed to contain little sugar, high amounts of protein and supports digestive wellness. Food and beverage consultant Julian Mellentin's report 10 Key Trends in Food, Nutrition and Health 2020 highlights the consumer trends driving growth in the industry.

"Inulin has become a success as a natural sugar replacer, used in an ever-growing number of products, and its presence means that companies can also flag up the enhanced fibre content on the label," Mellentin said.

A type of soluble fibre found in many fruits and vegetables, such as bananas, onions, wheat and chicory root, inulin is made up of chains of fructose molecules that are linked together in a way that cannot be digested by the small intestine. Instead, inulin travels to the lower gut, where it functions as a prebiotic. To prevent consumer confusion between prebiotics and better-known probiotics, brands will sometimes refer to prebiotic ingredients by their source, such as 'chicory' or 'chicory root'.

"Protein is now a 'permission to indulge' ingredient, increasingly widely used in ice-creams and desserts — where it is often paired with inulin," Mellentin said.

Troo Granola, for example, uses inulin syrup in its products as it serves both as a prebiotic fibre and a sweetener.



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# BrewLab

## being developed in Qld for craft beer brewers

**Craft beer production in Queensland is currently worth more than \$62 million annually, but has the potential to contribute more, so the Palaszczuk government is investing \$1.1 million over five years to deliver a BrewLab in early 2020.**

**L**ocated at Coopers Plains Health and Food Sciences Precinct, BrewLab will include a sensory lab and quality assurance services, where brewers can have their beers tasted by an expert panel or focus groups. The beer will be tested for elements such as acidity and alcohol volume.

Minister for Manufacturing Cameron Dick said the Queensland BrewLab will give craft brewers the ability to develop and test

new beer recipes without interrupting their own production lines.

“Providing craft brewers with state-of-the-art facilities to create new recipes will ensure the local industry continues to grow and more jobs are created for Queenslanders,” Dick said.

“This will help brewers identify target markets, potential product improvements and opportunities for new product development.

Opening in early 2020, the Queensland BrewLab will also be home to a TAFE course in brewing. This will enable brewers to get their brewery staff trained in precise identification and tasting of aromas, flavours and tastes. Applications for Certificate III in Food Processing (Brewing) will be opening in 2020, with the new TAFE qualification suitable for first-time brewers as well as seasoned professionals wanting to improve their skills.

“This collaboration between TAFE and the BrewLab will mean Queenslanders will be able to access the training they need to fill highly skilled brewing jobs, ensuring businesses can grow their local workforce,” Minister for Training and Skills Shannon Fentiman said.

Through the Queensland BrewLab, brewers can also access the Grains Quality Research Lab in Toowoomba to assess grain and malt quality, which is essential to the successful execution of the brewing process.

Steve ‘Hendo’ Henderson from Rockstar Brewer Academy said BrewLab will give brewers the tools to ensure they’re delivering the best possible product into the market.

“Consumers naturally gravitate towards a high-quality product, and facilities like the Queensland BrewLab give industry a way to make sure we have high quality beer on tap,” Henderson said.

“As an industry, we want to welcome new consumers; we want them to taste a craft beer, enjoy it and then come back for more. That’s how we’ll grow the craft brewing industry in Queensland.”

The Queensland BrewLab sits within the Department of Agriculture and Fisheries’ Food Pilot Plant facility.

The Food Pilot Plant provides technical and research capability to the broader food industry across Queensland by giving small-to medium-sized enterprises access to world-best practice food processing areas and technology, as well as technical support for food technology, consumer and sensory science and food quality.



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## Not just gelled desserts

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The texture of food is an important part of enjoying foods. In order to develop enjoyable food, it is important to understand the properties that determine how consumers experience biting and swallowing. To assist with this understanding, better methods for testing are required to capture the motion inside liquid materials, especially in the case of foods that are complex liquids, like gelled desserts.

Testing devices have been improved using different geometries in the testing chamber, and more recently, better results have been achieved using information from rheological testing coupled with results from other tests, such as inner visualisation techniques and ultrasonic imaging. But traditional methods have been unable to produce information about time-dependent properties.

Researchers have now introduced an updated method that can measure linear viscoelasticity and phase lag simultaneously in an opaque liquid, capturing information

about complex rheological properties. In a study published in *Physics of Fluids*, from AIP Publishing, Taiki Yoshida, Yuji Tasaka and Peter Fischer present the details of the ultrasonic spinning rheometry method they developed. It substitutes velocity profiles of food into the equation of motion to capture information about complex rheological properties.

The researchers used a popular Japanese dessert called *Fruiche*, which includes fruit pulp and whole milk that transforms into a gelled form with an egg carton-shaped structure. The complexity of this liquid includes properties that are hard to measure with traditional rheometry methods because of the effect of shear history, shear banding, shear localisation, wall slip and elastic instability.

“Evaluation of food rheology with time dependence is a challenging target,” Yoshida said. “Based on the equation of motion, the ultrasonic spinning rheometry method can evaluate instantaneous rheological properties from the measured velocity profiles, so it can present true rheological properties and their time dependence from the perspective of physics of fluids.”

The updated method also has applications in chemical engineering for understanding polymerisation and dispersion densities, as well as in complex fluids such as clay, with applications in civil engineering and cosmetics. The researchers plan to further advance the method to include more points at which information can be gathered about the invisible properties of complex liquids. They also plan to further develop the industrial aspects of the technique, including inline rheometry for test samples flowing in a pipe.

## Cultures for plant-based products

The DuPont Danisco VEGE cultures range is designed for fermented plant-based products, responding to health, wellness and taste and texture trends.

New additions to this range — HOWARU Dophilus VG, which contains *Lactobacillus acidophilus* NCFM, and HOWARU Bifido VG, which contains *Bifidobacterium lactis* HN019 — have documented, positive results in human studies for digestive health and wellbeing.

Available in single strain form, this range is non-dairy, non-animal, non-allergen, non-GMO and is suitable for vegan diets. It is also easy to integrate with existing cultures used in plant-based fermented food and beverage formulations.

The cultures were developed for a variety of plant-based raw materials, such as soy, peas, coconut, almond, nuts, oat, maize, rice, fruits and vegetables to satisfy consumer taste and texture expectations.

**DuPont (Aust) Limited**

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# ON THE SHELF

## Flash-brewed coffee in a can

In November 2019, Suntory BOSS Coffee introduced to Australia its flash-brewed, ready-to-drink coffee that is packaged in a can.

Australia is a coffee-loving nation that continues to be fascinated by Japanese culture. The land of matcha, cherry blossoms, emojis, sushi

and animé has captivated our imagination with its adventurous innovations for years. Now we can add chilled coffee in a can to the list.

Around 321 million cans of chilled coffee are consumed in Japan every year — that's 600 cans every minute. Now Australians can find out why it's so popular, with the launch of Suntory BOSS Iced Long Black and Iced Latte Coffees.

The coffee is created using the traditional Japanese flash-brew method. Coffee beans are brewed piping hot to release the rich aroma, then chilled in a 'flash' to lock in flavour. This process is claimed to set this coffee apart from the rest. While flash-brew has been a staple in

Japan and has been around since the 1960s there, it's said to be a relatively new concept in Australia.

Shana Khan, Inventions Manager, Frucor Suntory, said: "The product first hit the Japanese market in 1992 and has been hugely popular there ever since. We know Aussies love their coffee — in fact three-quarters have at least one cup every day and one in four say they can't survive the day without it.

"We are incredibly excited to bring the iconic Suntory BOSS Coffee to Australia," Khan said.

Features of Suntory BOSS Coffee include:

- Iced Long Black contains no dairy and no sugar, has five calories per can and is keto-friendly.
- Iced Latte contains 6.3 g sugar and 52 calories per can.
- 135 mg caffeine per 237 mL — just shy of an average 150 mg double shot.
- The can is recyclable.

For more information, visit [www.suntorybosscoffee.com.au](http://www.suntorybosscoffee.com.au).



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