food australia
Official publication of AIFST Inc
www.foodaust.com.au
OCTOBER/NOVEMBER 2013

ELEVATE CONFIDENCE IN FOOD SAFETY

Advancing technologies for analysis

Also Inside

ISSN 1032 5298 • PRINT POST APPROVED PP241613/00096
VOLUME 65 • ISSUE 5

ON THE COVER

Elevate Confidence in Food Safety

With the globalization of the food chain, protecting both the consumer and your brand becomes more demanding. Today, the food and agriculture industry faces ever-increasing demands for more sensitive, productive analytical solutions. You are committed to providing food, produce and beverages of consistent quality and uncompromising safety. Agilent Technologies leads the industry with products and services to help you deliver what your customers demand. Our instruments, systems, and supplies are used throughout the food production chain, including incoming inspection, new product development, quality control and assurance, and packaging. Agilent stays informed of the latest trends and issues in the industry and develops systems and applications that meet the latest requirements.

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OCTOBER/NOVEMBER 2013
Volume 65 Issue 5

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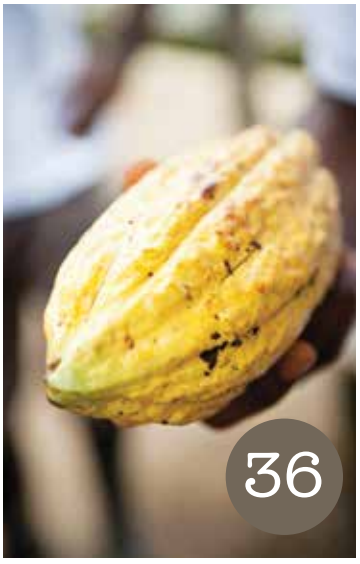

FEATURES

REGULARS

food australia
Official publication of AIFST Inc

Published by Australian Institute of Food Science and Technology Incorporated.

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Subscription Rates: Australia $110; overseas (airmail) $175; single copies $11; overseas $17.50

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food Australia is the official journal of the Australian Institute of Food Science and Technology Incorporated (AIFST). Statements and opinions presented in the publication do not necessarily reflect the policies of AIFST nor does AIFST accept responsibility for the accuracy of such statement and opinion.

Editorial contributions are invited; guidelines are available on the publication's website. We no longer accept research papers.

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FROM THE EDITOR

Food safety is never far from the headlines. And lately it seems that New Zealand's dairy industry is rarely absent from food safety news The latest round of problems concerning its two largest dairy producers not only caused angst among those directly connected to the issues but also affected a much wider net ("New Zealand – 80 per cent Pure?", page 42), when the news of China invoking a temporary ban on whey and dairy base powder products from Fonterra resulted in a one per cent drop in the value of the New Zealand dollar.

On the other hand, ingenuity within the industry is leading to healthier food products and novel ways to use previously discarded materials. From the food scientists in Brazil ("Making toppings stick", page 31), who claim to have developed a method of retaining up to 70 per cent of toppings that fall off food products to using excess fruit and vegetable castoffs to make nutrient-rich flours for biscuits and bars ("News from the Lab", page 29), innovation continues to drive positive developments across the industry.

Here at home, an intriguing experiment to encourage consumers to reduce their sodium intake is underway in New South Wales ("Drop the Salt Lithgow", page 26). The campaign included door-to-door visits where residents were given the opportunity to swap their regular salt with a low-sodium product. It will be interesting to see if the efforts pay off – especially in light of ongoing research that shows that, to date, many efforts to get the public to follow healthier diets have not been a success (News, page 11).

Lynn Elsey
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Average Net Distribution
1 October 2011 -
30 September 2012
2764

IN SUPPORT OF A REVIEW OF GLUTEN FREE REGULATION FOR AUSTRALIA AND NEW ZEALAND

Words by *David Sullivan*

Currently in Australia and New Zealand a product that carries a "gluten free" claim must not contain any detectable gluten when analysed in a laboratory. Consumers seeking to avoid gluten in their diet rely on food choices that are validated by accurate measurement of gluten proteins in gluten free food.

Advances in analytical methodology have resulted in lower limits of detection for gluten such that sub-clinical concentrations of gluten may be detected. Any detection of trace levels of gluten, irrespective of how small the level, means that foods cannot be labelled as gluten free under the current definition in the Code.

It is becoming harder for manufacturers to meet this test.

> *To succeed as a treatment, the GFD needs to be more achievable*

When the current standard was introduced almost 13 years ago, analytical methods could only detect gluten at levels of 30 parts per million (ppm) and above. In the year 2000, the limit of detection was 30ppm (mg/kg). By 2005, the limit of detection had reduced to 10ppm (mg/kg) and by 2010 the limit was down to 3ppm (mg/kg).

The effect is that "gluten free" has never meant the absence of gluten. Residues of gluten have been tacitly permitted by the legislation, provided that the residue of gluten has been less than the limit of detection. The "no detectable gluten" has been a moving target for manufactures and suppliers of gluten free products in Australia and New Zealand. This creates uncertainty for manufactures and suppliers and provides no benefit to consumers seeking gluten free products.

Now, tests that can measure gluten at parts per billion (ppb) are being utilised in scientific research and may soon be the norm in commercial

laboratories. Mass Spectrometry (MS) methods will likely play an important role, providing a viable alternative confirmatory method since MS has the potential to directly detect proteins/peptides (and therefore, the hazard itself) at low levels, similar to those achieved by ELISA and PCR. When this occurs, and it is when, not if, Coeliac Australia believes that many, if not all, manufacturers of gluten free products will struggle to maintain their gluten free status.

In Europe and more recently in the US, food laws state that gluten free claims can be made where a food contains no more than 20ppm gluten (20mg/kg). This level is based on the advice of leading medical experts and on the weight of scientific evidence that supports 20ppm as a safe threshold of gluten intake for people with coeliac disease.

The chairman of the Coeliac Australia medical advisory committee, Jason Tye-Din, has confirmed support for this position:

"The gluten free diet (GFD) is a complex treatment, and strict exclusion of dietary gluten is challenging. Not all Australian coeliacs achieve small bowel healing on a GFD in a timely manner, and many patients remain sub-optimally compliant with the GFD. To succeed as a treatment, the GFD needs to be more achievable, and satisfactory access to affordable gluten free foods is a key component. I believe Coeliac Australia's move to bring Australia in line with the Codex standard will support the viability of gluten free food production and ensure gluten free food choices are not compromised."

Establishing a defined threshold (the Codex standard) will move coeliac disease patients towards a more acceptable combination of safety and accessibility of gluten free foods to optimise their treatment. People will have the choice to avoid food containing detectable gluten (under 20ppm) from their diet if they wish to do so. The big picture is that improving dietary treatment, as well as optimising early diagnosis and appropriate follow-up of patients to confirm healing, are critical measures likely to have the greatest benefit for patient's long-term health."

Gluten free claims already trigger a requirement to declare gluten in the Nutrition Information Panel (NIP) on food packaging. Under the proposed change, information about gluten content will continue to appear as part of the NIP. If a food contains detectable gluten, the NIP will declare this low, but not zero, level. Foods that are analysed as "no detectable" gluten under current test methods will continue to declare zero gluten in the NIP. The proposal gives the right to choose, a critical point that has been somewhat lost in the discussion.

Coeliac Australia believes a change to a gluten free standard of 20ppm is in the interests of the vast majority of coeliac and gluten free consumers in Australia and New Zealand. The priority of Coeliac Australia is to ensure consumers continue to have access to safe, affordable, high quality and widely available gluten free food without being limited by artificial barriers arising simply from improvements in test methods.

David Sullivan is the national business development manager for Coeliac Australia.

THE BANANA BAR

A banana wielding vending machine is giving Brisbane consumers a fresher snack option.

Third-generation Queensland banana grower Daniel MacKay wanted to make it easy for peckish shoppers and workers to snack on his products. But although the concept of a banana vending machine seemed simple, it took 20 years to bring it to fruition.

The lengthy process included developing a machine that would keep the bananas at an optimum temperature and wouldn't damage the fruit as it was dispensed. MacKay said that the ubiquitous banana bend presented an additional challenge, which eventually led to developing a new kind of banana that suited the machine.

Coming up with an automated process of wrapping the bananas in plastic – to provide extra protection during transport and to help extend freshness – involved yet another new round of creativity.

However, persistence paid off. The first Banana Bar machine is now in place in Brisbane's Post Office Square food court, where it dispenses bananas for $2 for three or $3 for five.

MacKay said that, thus far, the results were promising. If things continue, the company plans to expand the banana vending machine business across Brisbane and Australia.

MANUKA HONEY - MORE FAKE THAN REAL

The knock-off trade has discovered a goldmine selling fake manuka honey.

Although New Zealand honey producers claim to make just 1,700 tonnes of manuka honey per year, it is estimated that 10,000 tonnes are being sold worldwide annually.

Manuka honey attracts prices that are 10 to 20 times (or more) higher than other types of honey, due to its much-vaunted anti-bacterial properties. In the UK, jars of manuka-labeled honey retail as high as £35.

In the UK, where 1,800 tonnes of "manuka" are sold each year, tests by the Food Environment Research Agency (Fera) in 2011 found that out of five brands of products labeled as manuka honey, only one contained the non-peroxide anti-microbial activity that is unique to the genuine item. Further tests in 2012 and 2013 found similar results, including one that found that out of 73 products from the UK, China and Singapore, 41 failed the test.

In response, the UK Food Standards Agency issued a warning about the increasing number of fake products appearing in stores, advising anyone selling Manuka honey that they need to be fully aware that they must comply with the law or face the consequences.

LOLLIES JOIN THE ECO-CAPITALISM CAMPAIGN

Sweets may have a healthy angle after all – following the launch of an initiative in New Zealand to recycle used confectionery wrappers and turn them into new products.

The program, which is the brainchild of an American recycling business called TerraCycle, will be collecting used candy wrappers and using them to create a fabric, which will be used to make a range of products.

Along with helping the environment, the program also benefits New Zealanders. For every wrapper collected from the public (who can send them at no cost to collection points in New Zealand), TerraCycle will donate two cents to a school or charity of the collector's choice. Mondalez is funding the local collection platform.

TerraCycle has been championing eco-capitalism since 2001 and currently operates recycling projects in 23 countries in partnership with more than 100 major brands, including Kraft Foods, Nestle and Mars. It focuses on recycling materials that can't normally be recycled into usable items, such as park benches, backpacks and even flowerpots.

The founder and CEO of TerraCycle, Tom Szaky, is hoping to use the New Zealand promotion as a stepping-stone for broader exposure in the Asian market.

VITAMIN D ENRICHED MUSHROOMS

A new ultraviolet technique gives mushrooms with more than 100 per cent of the daily requirements for vitamin D2.

Food scientists at Pennsylvania State University (US) have patented an ultraviolet light process that lifts vitamin D levels in fungi from minimal to more than 600 IUs in less than a second. The pulsating ultraviolet flashes high energy waves onto the surface of mushrooms, converting the ergosterol found in the fungi into vitamin D. The process does not impact the appearance or taste of the mushrooms. Also, the team said that the vitamin D is retained even after a week of storage.

The researchers said that the process is similar to the way that human and animals synthesise vitamin D3 from cholesterol in the skin.

"We are hoping that mushrooms that are treated with this technique could be a real benefit for human health by serving as an excellent source of vitamin D and especially as a source for persons who may be at risk of vitamin D deficiency," said Michael Kalaras, a member of the Pennsylvania research team.

TASSIE CHEESE FETED

Tasmanian cheese maker Bruny Island Cheese Company has been named as Telstra's 2013 Australian Business of the Year. The company also won the Telstra Small Business Award.

Bruny is the first Tasmanian company in 21 years to win the top award. The company was recognised for the quality of its cheese as well as the role it plays in local agri-tourism and supporting farmers in the region.

The artisan cheese company is run by Nick Haddow, who founded the business after working for a number of cheese specialists in Australia and Europe.

"I am a traditionalist who recognises that great cheese was made for centuries before modern technology played a role and I believe passionately in the old way of making, maturing and marketing cheese," Haddow said.

"Bruny Island Cheese Company is a role model for artisan food businesses in the 21st Century. It has a total focus on quality, customer experience and engagement, both online and onsite, innovation from paddock to plate and care for suppliers, staff, the local community and the environment," said Will Irving, the group managing director of Telstra Business.

Irving said that the judges were impressed by the company's innovative business model, which combines artisan traditions with the latest technology in packaging, marketing and sales. He also noted the company's strong commitment to local artisan businesses, which helps provide economic sustainability to the area.

Bruny Island sells its products online, onsite and through its 8,300-member Cheese Club.

CAFFEINE LINKED TO LOWER SUICIDE RATES

A new study has found that drinking two to three cups of coffee per day is linked to a 50 per cent reduction in suicide.

The study, which was undertaken by a team of researchers at Harvard School of Public Health, involved 43,599 men and 164,825 women. It assessed their consumption of caffeinated coffee (through food-frequency questionnaires) every four years, from 1988 to 2008. Suicide rates were determined by physician review or death certificates.

The researchers found that the risk of suicide for adults who drank between two and four cups of coffee a day was 50 per cent lower than adults who drank either decaf, little or no coffee. Although caffeine consumption included a few beverages including chocolate, tea and soft drinks, the researchers said that coffee was the main source.

The researchers hypothesised that caffeine might be acting as a mild anti-depressant by boosting production of certain neurotransmitters in the brain, including noradrenaline, dopamine, and serotonin. They said that this could also explain the results of other studies linking coffee consumption to lower rates of depression.

The study, "Coffee, caffeine, and risk of completed suicide: Results from three prospective cohorts of American adults" was published in *The World Journal of Biological Psychiatry* (doi:10.3109/15622975.2013.795243).

In spite of the results, the authors did not recommend that depressed adults increase their consumption of caffeine as this could lead to unpleasant side effects. They also did not find any suicide rate differences for study participants who consumed four or more cups of coffee a day, but said that this could be due to a smaller number of suicides in this group.

N

SUPER PRAWN FOOD

Australian scientists have released a new feed additive which they say leads to healthier and faster growing prawns.

The developers of the natural food source, called Novacq, claim it can lead to 30 per cent faster growth rates in prawns. The product is based on marine microbes. Researchers at CSIRO, who have been working on the additive for a decade, say the new product will allow the prawn aquaculture industry to move away from relying on wild fishery resources.

"This is a major achievement for the sustainability of Australia's aquaculture industry, as prawns fed this diet are not only a top quality product and reach market size faster, they also no longer need to be fed with any products from wild fishery resources," said Nigel Preston of CSIRO, who has been involved with the Australian prawn farming industry for more than 25 years.

The new product will be produced and distributed by Ridley AgriProducts, a joint CSIRO and Australian company.

NEW GMO WEBSITE

In response to what they claim is incorrect information about genetically modified organisms, a consortium of biotech companies has launched a new website.

The site, GMOAnswers.com, was developed as a source of information about GMOs. The site allows the public to post questions about GMOs and provides answers.

The site aims to make GMO information, research and data easy to access and evaluate and to help support farmers who are using GMOs, especially those farming with the related companies' biotech seeds. The site, which was launched by the Council for Biotechnology Information, is being funded by organisation members including BASF, Dow AgroSciences, Monsanto and DuPont.

"If you talk to consumers or policy makers interested in food, unaided they don't raise any concerns about GMOs. They talk about nutrition and safety and allergens. The vast majority of people don't know what GMOs are," said Cathy Enright, the executive director of the CBI.

According to Enright, answers to the questions are derived from a number of sources, based on a "community of independent experts, nutritionists, farmers – both conventional and organic". Company employees will answer questions regarding company-specific matters, Enright said that the companies and others who provide answers are not being paid.

The site also includes a public review section where food safety information, which is provided to the FDA by the companies, can be found.

SMART LID

Australian coffee drinkers can now sip their drinks without fear of being burnt – and retailers can rest a bit easier about lawsuits.

A Sydney company has created heat sensitive cup lids for coffee, hot chocolate and tea. The lids change colour, from bright red to brown, as the internal liquid cools. The tops were designed to help ease concerns regarding safety issues, from consumers to café owners, as a result of drinking hot beverages.

The lids, which are HACCP and ISO 9001:2000 certified, are being manufactured by Rema Industries, an Australian disposable container company, and are now available across Australia and overseas.

Australian-based Smart Lid Systems has been working on developing heat sensitive lids for around a decade.

According to the company, the lid works on all hot drinks at temperatures above 48°C.

FRUIT AND VEG CONSUMPTION DROPS

Myriad efforts and strategies to promote healthier eating through the consumption of fruits and vegetables are leading nowhere. Or so it seems from a new report about eating habits across the US and Western Europe.

The report, "A Puzzling Phenomenon" which was published by Rabobank's food and agribusiness research and advisory team, found that although governments and an array of health organisations have taken great efforts to promote the benefits of healthy eating, consumption of fruits and vegetables have declined over the past decade in the US, Europe and Japan.

The report suggested that lower incomes, perceived price increases and strong competition from processed and convenience foods were behind the drop.

"The challenge for the fruits and vegetables industry is to close the gap between what consumers say they want and what they actually do," said Cindy van Rijswick, a Rabobank analyst.

"Surveys have shown that, in principle, consumers are positive-minded about healthy eating, but in practice they are easily swayed by creative marketing of processed food and beverages and exhibit a strong bias for convenience products."

The report found that the sophisticated marketing efforts by processed food manufacturers made it difficult for producers and sellers of fresh produce to compete, as most of their products are sold unpackaged and unbranded.

The bank suggested three ways for the fruit and veg industry to regain market share:

- Reducing inconvenience: fight the increasing popularity of prepared products by offering more convenience (for example, by offering chopped vegetables that can be heated directly in the microwave without removing packaging).
- Basing marketing campaigns on more than health benefits: recognise that consumers are already aware of the health benefits of fruit and vegetable and promote other positive attributes, such as convenience, taste, enjoyment and versatility of fresh produce.
- Better cooperation along the supply chain: to keep inferior products off the market.

PACKAGING KEY TO REDUCING FOOD WASTE

A new Australian study highlights the significant role that packaging plays in the mounting problem of food waste.

The study, which was undertaken by RMIT University's Centre for Design, investigated where and how food waste occurs throughout Australia's fresh and manufactured food supply chains. It also recommended options for addressing the problem.

"The role of packaging in minimising food waste in the supply chain of the future" study was led by Karli Verghese of RMIT, who said that "no significant research had previously been conducted into the role that packaging plays in minimising food waste in Australia."

The study was commissioned by Chep Australia, in response to a white paper from the AFGC (April 2012) that found a gap between understanding food waste and product and packaging design. The goal was to uncover trends that were likely to impact food waste in urban and regional Australia to 2030 and identify packaging options to help minimise food waste.

The study included an international literature review and interviews with representatives from 15 organisations involved in the Australian food and packaging supply chain. Although the study considered food waste throughout the entire food supply chain, it focused on waste that occurs prior to consumption, including agricultural production, post-harvest handling, storage and food manufacturing, wholesale trade, distribution and food services. It also covered food rescued through charities.

According to the study, more than 4.2 million tonnes of food waste end up in Australian landfills each year. Around 1.5 million tonnes of the waste comes from the commercial and industrial section, costing $10.5 billion in waste disposal charges and lost products. The food service sector is responsible for 661,000 tonnes of waste, followed by manufacturing (321,000 tonnes), retailing (179,000 tonnes) and wholesale distribution (83,000 tonnes).

The research also found that food waste recovery rates were quite positive in the manufacturing sector, with 90 per cent of waste reused.

The study suggests a number of opportunities to reduce food waste, including using packaging that provides better protection and shelf life for fresh products and supporting the recovery of surplus and unsaleable fresh produce for food rescue organisations.

It also recommends better design so that packaging is fit-for-purpose and the adoption of innovative packaging materials and technologies, such as modified atmosphere packaging and oxygen scavengers, to extend the shelf life of foods.

The report can be found on the Chep website (www.chep.com).

OILY FISH MAY REDUCE BREAST CANCER

A new study has found that eating oily fish is associated with a 14 per cent reduction in breast cancer.

The study, which was carried out by a team of researchers at Zhejiang University in China, involved a meta analysis and systemic review of 21 studies covering 883,585 women in the US, Europe and Asia.

They found that every increase of 0.1g per day of n-3 polyunsaturated fatty acids (PUFAs) led to a 5 per cent lower risk of break cancer. This level of risk reduction translates to an intake of one to two portions a week of salmon, tuna, sardines or other oily fish.

The n-3 PUFAs, which include ALA, EPA, DPA and DHA, help regulate blood vessel activity and parts of the immune system. The main source of EPA, DPA and DHA is oily fish while ALA is found mainly in nuts, seeds and leafy green vegetables.

The team said that although n-3 PUFAs have been noted as possible options for reducing the risk of cancer, until now studies related to a link were inconsistent. So they decided to investigate the association of fish and n-3 PUFAs with the risk of breast cancer and evaluate potential dose-related relationships.

Along with concluding that higher consumption of dietary marine products led to a lower risk of breast cancer, the team said that their study highlighted a need for further investigations which could result in better public health outcomes.

The research, "Intake of fish and marine n-3 polyunsaturated fatty acids and risk of breast cancer: meta-analysis of data from 21 independent prospective cohort studies", was published in the 27 June 2013 *British Medical Journal*, BMJ 2013 346:f3706.

New MD for Trippas White

Restaurant and catering company Trippas White Group has appointed Joseph Murray as the company's new managing director. Murray joined the company in 2008 as chief financial officer and became chief operating officer in 2011.

Brien Trippas, the group's co-founder and former managing director, has moved into the newly created position of executive chairman to further develop strategic relationships and the company's growth strategy.

Fonterra Fallout

Gary Romano, Fonterra's NZ Milk Products managing director, has resigned his role with the New Zealand dairy producer. Romano's departure followed the news that 38 tonnes of Fonterra's whey protein was contaminated.

Theo Spierings, the company's CEO, will assume responsibility for the operations of NZ Milk Products

The company's board of directors has appointed new members to an inquiry team, which is undertaking a review of operations following the whey protein contamination issue. The committee, which includes Ralph Norris (chairman and Fonterra director), now includes Stuart McCutcheon, the vice chancellor of the University of Auckland. The committee has appointed Jacob Heida, an international expert on food manufacturing and safety, to handle the technical aspects of the inquiry. Heida is currently a member of the Disciplinary Committee of the Netherlands Controlling Authority for Milk and Milk Products and has experience in whey production processes and standards.

Australian leads Chobani

US-based Chobani has appointed an Australian, David Denholm, as president and COO of the company. The Sydney-born and Queensland raised Denholm has more than 20 years experience in the retail and consumer packaged goods industry.

New Chief for Metcash

Ian Morrice has taken over as CEO of supermarket supplier Metcash. Morrice has replaced Andrew Reitzer in the role. "A key priority will be to review the food and grocery operations to respond to the continuing deflationary and competitive market conditions," Morrice said.

Infant Nutrition Council expands board

In a quest to make its board more representative of the entire infant formula supply chain in Australia and New Zealand, the Infant Nutrition Council has broadened its board by appointing two new board members; Guy Wills, general manager of New Image Group and Michael Teen, general manager Innovation for Westland Milk Products. The board also has a new chairman, Reece Prewett, director of Formulated Foods at Fonterra.

"Due to the number of new members who are exporting locally produced infant formula products, we have broadened out strategy to include focus on the integrity of the full supply chain," said Jan Carey, chief executive of the INC.

AIFST

CONVENTION ROUNDUP

From Bollywood to culinology, the 2013 convention was a showcase for innovation in food science.

Words by *Stefan Worsley*

The 2013 AIFST convention in Brisbane was keenly anticipated, with delegates pouring in the door by mid-afternoon on the Sunday. Whether it was the intrigue of hearing speaker Amanda Gore, the freebies from the exhibition stands or just the warm Queensland weather - numbers have rarely been higher on the opening day.

Attendance for the whole convention nudged the 500-mark; a level that has historically only been achieved when the event is held in either Sydney or Melbourne. This is surely a testament to a growing industry and the importance of Queensland as a hub of food technology.

The broad range of exhibitors were complimented by the diverse number of subjects addressed by experts from around the globe. Over a hundred speakers were packed into the three-day event, with concurrent sessions running in three auditoriums.

Food scientists sat side by side with food marketers, digesting topics from "culinology" to nutraceuticals. While the AIFST convention is driven by technological advances in the food industry, there were many inter-dependent topics tackled such as media influences on consumers and the commercial applications of new food technologies; innovation was a constant thread throughout the event.

Session highlights included a focus on the history of food in Australia including Queensland's food icons (food consultant Alison Alexander), foodbourne illness in vulnerable populations (Martyn Kirk, ANU), a mini workshop on salt and sodium reduction and the past, present and future of military food technology (Chris Forbes-Ewan, DSTO).

Awards

The annual student product development competition was awarded to Toni Griggs and Shannon Hearn from the William Angliss Institute with their Goats Milk Chocolate.

The 2013 Malcolm Bird Award was presented to Randy Adjonu from Charles Sturt University.

Randy Adjonu

As the winner of the Keith Farrer Award, Ian Brown presented a talk about his career in the food science industry (see page 18 for the full presentation).

The AIFST Food Industry Innovation award went to Australian Functional Ingredients, spearheaded by Vic Cherikoff, for its herbal-active product.

Something for everyone

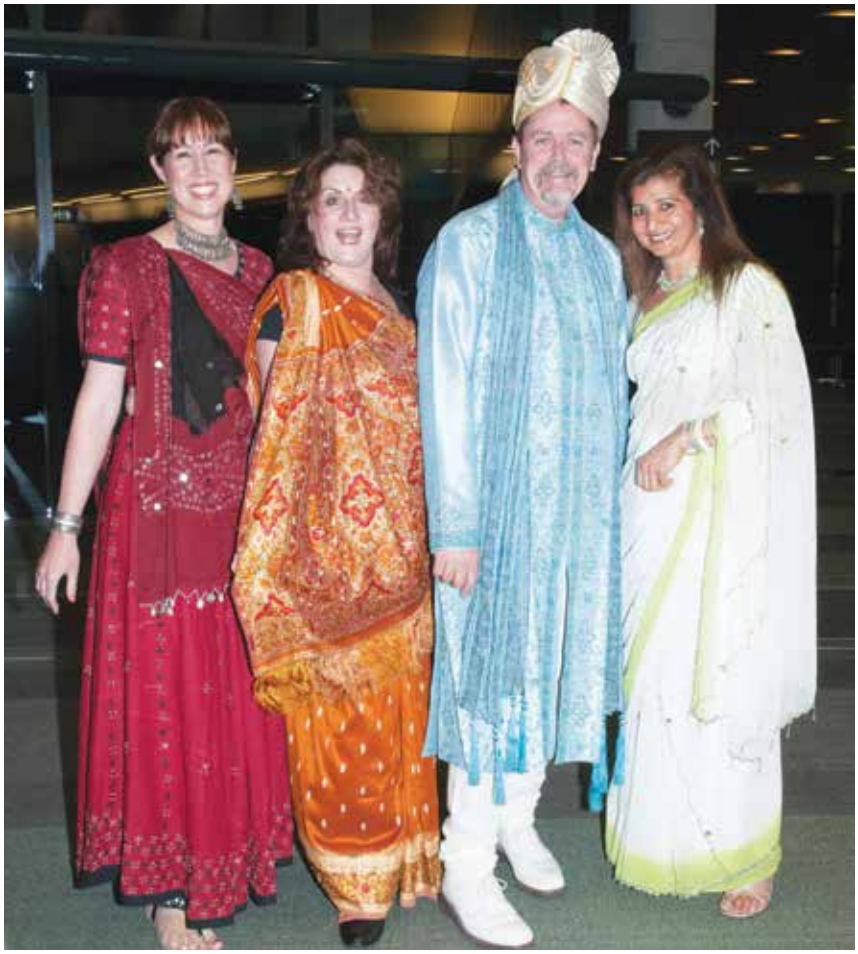
While the convention sessions provided ample food-for-thought, the integration between business and pleasure was obvious, with two sold-out breakfast events, although Tuesday's innovation breakfast may have been a struggle for those who indulged in the impressive selection of wines and cheeses in the Boulevard room the previous night.

The convention dinner was a particular highlight with 300 diners embracing the Bollywood theme – although I'm sure some were wearing the linen from their hotels.

The intimate workshops on the final day were a fitting end to a successful and enjoyable event, as the exchange of groundbreaking ideas reinforced the evolution of our industry.

Stef Worsley is the AIFST Business Development Manager.

The 2013 AIFST convention in Brisbane.



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KEITH FARRER AWARD OF MERIT 2013

The following is based on Ian Brown's presentation at the AIFST 2013 Convention.

Words by *Ian Brown*

I would like to thank the members of the institute who have thought me worthy of his honour. It has been my privilege to have been involved and contributed in a small way to the advancement of food science and technology in Australia and overseas. Amongst the many people that have influenced and supported my activities over the years I would like to acknowledge the one person who has been there during it all, my wife Cheryl.

My involvement in food science commenced when I was studying at the University of New England in Armidale for a BSc Dip Ed, through a course conducted by Bob Gerdes. This course included the preparation of gin and cheese from first principles.

In 1980 I was approached by Ken McNaught to join Fielder Gillespie as a research chemist. Fielder Gillespie was a vertically integrated agrifood business involved in animal husbandry, stockfeed manufacture, flour mills, starch, modified starches and proteins, including maltodextrins, glucose syrups, dextrins, dextrose and gluten manufacture plus baked and consumer foods. Fielder's also had an innovative side, working on microbiologically derived proteins and carbohydrates, monoclonal antibodies, new processing techniques such as supercritical extraction, membrane separation and electrodialysis, the investigation, breeding and processing of a broad range of crops such as wheat, maize, cassava, sorghum and lupins and the development of foods for consumer launch in Australia and overseas. Much of this work was either conducted or organised from the NSW regional city of Tamworth with extensive analytical, laboratory and pilot plant facilities and good links to various universities. As you can imagine, Fielder Gillespie and its subsequent related companies provided a stimulating environment and a diverse range of experiences.

While I was in Tamworth I studied business and marketing. But when I decided to undertake a research MSc at UNE to study the structure and physiological effects of Australian maize starches, an important new chapter in my life opened.

Ian Brown

Since the age of exploration maize has been transported to and grown around the world, including in Australia. Three types of maize, regular, waxy and high amylose, were grown in Australia specifically for Fielder Gillespie and were used in both food and industrial applications.

Starch is mainly composed of two polymers of glucose called amylose and amylopectin. The proportions of these polymers in the starch profoundly effects their physiochemical and organoleptic properties. I was particularly interested in high amylose maize (HA maize). First bred in the 1940s, HA maize had amylose contents greater than 40 per cent. The increased amylose content provided a number of remarkable properties, including high gelling temperatures and rapid gel formation on cooling, and have led to the use of HA starch in food applications such as deposited confections.

In the early 1980s it was observed that some starches escaped digestion in the upper gastrointestinal tract. This "resistant starch (RS)" had dietary fibre (DF) like physiological effects. Research conducted during my MSc showed that as the amylose content of maize increased, so did the RS and DF content of the starch. This was my 'Eureka' moment. With amylose contents of more than 80 per cent, the starch (HAMS) now had sufficient DF content, approximately 30 per cent, to allow foods to be formulated with starch as the fibre source. I originally showed the viability of using HAMS as a fibre source in bread, pasta and breakfast cereal.

In 1993 the world's first RS ingredient was launched by Goodman Fielder under the trade name Hi-maize. In early 1994 Hi-maize was included in its first commercial food, Wonder White bread; white bread with twice the "invisible" fibre of normal white bread without any change in appearance or taste. It successfully gained 12 per cent of the white bread market in the first 20 weeks after launch and made a major contribution to dietary fibre consumption in Australia. It is still being sold in Australia today (AIFST recognised Hi-maize with the Food Industry Innovation Award in 1995).

The success of Wonder White lead to the incorporation of Hi-maize in numerous other foods including breads, muffins, pasta, noodles, breakfast cereals, drinks, bars, yogurt, confectionery and specialty dietary foods.

Resistant Starch

In order to satisfy the increasingly challenging demands of new applications, many new forms of RS have been developed over the years but the use of hydrothermal treatment to double the DF content of the starch or flour was particularly important for the increased adoption of RS ingredients. Many people played important roles in the development and commercialisation of Hi-maize and helped solve the many issues that arose, particularly when the program went global in 1997. The important elements of the program included:

- Sources of resistant starch (HA maize breeding program and commercial production)
- Manufacturing, which initially included use of conventional maize starch mills but with the subsequent development of many new types of RS required specialist equipment for new types of RS
- Methods of measurement of RS, including a method for RS quantification accepted by AOAC in 2002
- Acceptability of the foods, including extensive product application, customer and market research
- Patent & IP protection, including more than 20 patent applications
- Meeting consumer needs, including extensive market research conducted in many countries
- Regulatory approval, including application and approval for the use and possible health claims in various countries
- Substantiating credible physiological and health benefits, including synergistic effects with other ingredients (such as psyllium, fructooligosaccharides).

Many of the aspects associated with the RS project had to be developed, as much was unknown. I found myself having to learn a great deal on the job and needed to be a scientist, technologist, applications specialist, entrepreneur, marketeer, IP and regulatory affairs manager – and anything else that needed to be done. This list of roles finally included divestment adviser when Goodman Fielder sold the Hi-maize and starch business to Penford in 2000, and when Penford subsequently sold it to National Starch and Chemical Corporation in 2003.

The investigation of the physiological effects of resistant starch has been and continues to be of particular interest to me. Over the years I have worked with more than 50 researchers and institutes globally to identify the physiological effects of RS, sometimes to expand on existing work and at other times to explore new areas.

This research has lead to visiting or adjunct professorships including current roles at Flinders University of South Australia and the University of Colorado. I would like to especially note research colleagues David Topping, Tony Bird and Richard Le Leu (CSIRO), Graeme Young (Flinders University), Janine Higgins and Paul MacLean (Colorado University) and the late S Kiriyama (Hokkaido University) and Tatsuya Morita (Shizuoka University). In the early 1990s I was involved in various research projects in Japan and this led to an invitation to undertake a PhD in Applied Bioscience at Hokkaido University.

Some of the studies investigating the physiological impact of RS have explored:

- High tolerance levels
- Reduction in glycaemic and insulinaemic response
- Improved gastrointestinal health
  - o Treatment of constipation
  - o Specialist dietary fibre source for coeliacs
  - o Treatment small bowel syndrome
- Improved on colonic microflora and as a prebiotic
  - o Increase beneficial bacteria and decrease pathogenic bacteria
  - o Act as a prebiotic
  - o Treatment for ulcerative colitis
  - o Protection against bowel cancer
- Improved immune response
- Increased micronutrient absorption (such as calcium)
- Impact on energy metabolism including increased lipid metabolism
- Specialist areas such as a fibre source for coeliacs and a component of animal weaning formulations for cattle and pigs
- Treatment of acute diarrhoea.

One area where RS may have a profound impact on disease and health is in the prevention and treatment of diarrhoea. Diarrhoea is the most common disease in the world, with some 2.5 billion cases per year leading to more than 1.5 million deaths in children under 5 years of age. The established treatment is the use of an oral rehydration solution (ORS) containing glucose and salts, which seek to keep the body hydrated while the disease runs its course. In 1993 professors G Young, H Binder and B.S. Ramakrishna conceived the idea that short chain fatty acids could increase the reabsorption of water from the colon, which in turn would decrease the amount of diarrhoea. A decrease in the amount and period of diarrhoea is significant in improving the chances of surviving the disease.

I had been collaborating with Young for some years, investigating the fermentation of RS in the colon which produces increased amounts of SCFA. A modified ORS containing RS in the form of high amylose maize starch (HAMS) was tested in the treatment of men experiencing acute diarrhoea caused by cholera. This resulted in a 35 per cent reduction in the period of diarrhoea. This decrease has since been demonstrated for both bacterial and viral induced disease and for adults and children. In 2008 the Bill and Melinda Gates Foundation provided a substantial development grant to facilitate the optimisation of the RS ORS formulation. After the completion of this study in 2011 they provided a major grant for multi-centre/multi-country clinical trials of the RS ORS on the subcontinent and in Africa. These trials are currently underway and it is hoped that a more effective treatment for acute diarrhoea will emerge from this work.

> *"The investigation of the physiological effects of RS has been and continues to be of particular interest to me"*

This program has also led to an investigation of ways to improve the immune status of individuals so that they could resist challenges that may result in acute diarrhoea. A two-year grant from the foundation is currently facilitating research on this topic.

Present and Future

Since my return to Australia in 2006 I have been the CEO of Clover Corporation. Clover is a small Australian publicly-listed company that has a focus on the biodelivery, mainly using proprietary microencapsulation processes, of sensitive and important nutrients such as long chain polyunsaturated fatty acids from marine, algal and fungal sources. These ingredients are used in foods, infant formula and medical applications; more than 80 per cent of our products are exported. Clover's significant revenue and profit growth has been based on leading edge developments in biodelivery and medical applications, supported by a dedicated staff with a keen market focus (AIFST recognised Clover in 2003 with the Food Industry Innovation Award).

During the past 30 years there has been a marked change in our understanding and appreciation of food and the individual components in the things we eat. This expansion of knowledge of food beyond its basic nutritional function has resulted in an acknowledgement that our diet and its component foods can potentially have a positive impact on our health. It has been a privilege to have been involved in these momentous changes as a scientist, technologist and businessman.

I have seen that in Australia we have the ability to discover, develop, innovate and commercialise new ingredients and food concepts and successfully take them to the world. This process is not easy but it is important for the maintenance of the vitality and success of the Australian food industry.

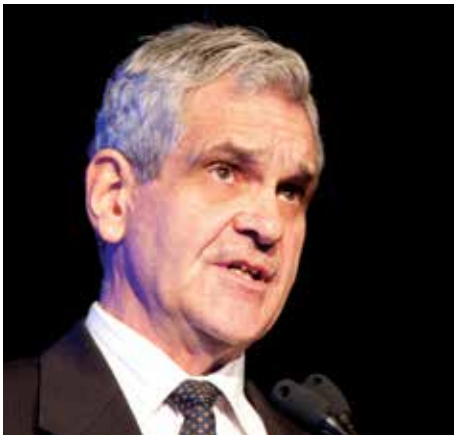
Finally, I would like to again thank the institute for this honour and to acknowledge my many friends and colleagues, who have been involved, supported and contributed to my endeavours over the years.

Ian Brown is the CEO of Clover Corporation. Brown delivered the Keith Farrer Award of Merit 2013 address during the AIFST 2013 Annual Convention in Brisbane, 15 July 2013.

A WORLD WITHOUT FOOD SCIENCE

This paper is based on the JR Vickery Address presented by Emeritus Professor Deeth at the 46th Annual AIFST Convention.

Words by *Hilton Deeth*



It is customary in a JR Vickery address to firstly refer to the great man and his contribution to food science in Australia and internationally. This one is no exception. In fact, the topic of this address is one on which Jim Vickery would have given an excellent presentation; why I say this will become clearer later. First, a little background on Dr Vickery.

He was one of three people appointed to a newly established food group of CSIR, the forerunner of CSIRO, in 1923 and in 1931 became officer-in-charge of the CSIR section of Food Preservation and Transport. He later went on to lead the division of Food Preservation in CSIR/CSIRO from 1940 until his retirement in 1967.

Significantly for this institute, he was a foundation member and vice-chairman of the Australian Section of the Institute of Food Technologists established in 1950, in 1967 he became the first president of AIFST. The 2010 book by Farrer *et al.*, *Birth of a Profession. A History of the Australian Institute of Food Science and Technology*, features Jim Vickery on its cover and contains a wealth of information on his involvement with the institute.

Apart from his visionary leadership, he was first and foremost a scientist, originally not a "food scientist" but like many AIFST members was trained in the basic sciences, in his case chemistry.

Food science as a discipline

On first thinking about this topic, I realised the need to define what food science is. It was certainly not around as a discipline when I was a university student. I, like Jim Vickery, trained as a pure chemist. My PhD was on the components of cypress pine resin, not closely related to food, unless of course you are into the Greek wine retsina. So I was interested in finding out when food science became recognised as a separate discipline. To my delight I found that Jim Vickery had the answers to my questions. In 1966 he delivered the first international lecture of the Food Group of the Society of Chemical Industry in London on the topic of "The scope and status of food science", which was published in *Chemistry and Industry* in 1967.

He defined food science as "the discovery and application of knowledge of the physical, chemical and biological (including nutritional) properties of foods and their constituents and the changes they undergo during handling, processing, preservation, storage and distribution". It also integrates many scientific disciplines including the most obvious –chemistry, microbiology and biochemistry – but also has strong links to others such as engineering, psychology, mathematics, agriculture and nutrition. The term food technology is frequently used as the application of food science. In this presentation, food science is used as a catch-all for all of the above.

It is interesting to note some perceptions of the scope of food science. For example, in May this year, *FoodNavigator* in a special focus

newsletter, revisited some of the top so-called "food science" stories of the year (2013) to that time under the heading "A slice of food science". The "food science" stories cited were:

- Red meat and heart disease: L-carnitine linked to increased risk
- Healthy brands taste better in consumers' minds
- Timing weight loss: It's not just what we eat but when we eat
- Protein-rich breakfast prevents "unhealthy snacking" later
- Western diet may cause brain impairment and neurodegenerative conditions
- Artificially sweetened sodas do not lead to increased sugar consumption
- Sugar-free and diet sodas linked to diabetes.

These are not representative of food science but clustered at one end of the food science spectrum, the consumer end, with an emphasis on the link between food and health and disease, as well as consumer science.

That food science and nutrition have become inextricably linked in recent times is beyond question. It is evidenced by the food science and nutrition education programs in several universities and the development of new food products which in recent years have been dominated by those which purport to address nutritional issues.

Vickery (1967) was uncertain when food science became accepted as a separate discipline. He noted that agricultural science and veterinary science, both multidisciplinary, were recognised well before food science. In Australia there was considerable research on food in the 1930s and during World War II by CSIR and some universities. This was largely related to problems with the quality and shelf-life of exported perishable food products such as meat, fruit and dairy products. During the war, attention was focused on food for the war effort. This research was performed by chemists, biochemists, biologists and engineers, not by so-called food scientists.

The first scientific food journal was *Food Research* which was founded during this time, in 1936. Interestingly, it changed its name to *Journal of Food Science* in 1961.

The first university food science courses commenced in the 1960s. Vickery, in his 1966 presentation, noted that there were two such courses in Australia at that time. However, these were predated by dairy science/technology and food analysis courses at technical colleges.

So it appears that food science was recognised by *name* in the 1960s but by *nature* it was recognised much earlier. I'd now like to look back at when food science, by name, didn't exist in Australia.

Beginnings of food science

WJ Young at the University of Melbourne, a professor of biochemisty, is credited with carrying out the first food science research. In 1996, Vickery, in an article entitled "William John Young: a Pioneer in Food Science in Australia", opined that Young was probably the first academic to take an interest in food science in Australia. Young worked closely with the CSIR food group which Vickery joined in 1923.

Interestingly from a Queensland perspective, Young collaborated with professors Bagster and Goddard at the University of Queensland. The name Goddard lives on at the University of Queensland, with the original biological sciences sandstone building named after him. He worked on bunchy top in bananas and fruit fly, so Queenslanders can probably claim him as their first food scientist. He was dean of agriculture for 20 years which demonstrates the link between agricultural science and food science.

According to Bastian *et al.* (1979) in *50 years of Food Research* (in CSIRO), the "founder of food science" was Sir William Hardy in the UK. Hardy was director of the Food Investigation Board set up in 1917 to address the problem of wartime food shortages caused to a large extent by spoilage of perishable foods. He went on to establish the Low Temperature Research Station in 1921. Vickery worked with Hardy before the establishment of the CSIR Section of Food Preservation and Transport in 1931. Hardy became part of the UK Institute for Food Research (IFR) which commenced in 1903, a little earlier than research on food commenced here. According to a *BiteSized History of IFR* (Institute for Food Research, 2012), research commenced with the establishment of the Long Ashton Research Station in 1903 and was followed by the Research Institute in Dairying (later National Institute for Research in Dairying) at Reading in 1912.

In 1990, Jim Vickery published the book *Food Science and Technology in Australia, A Review of Research since 1900*, where he chronicled food research for almost 90 years. To me it was a tremendous undertaking. One wonders who will take up the challenge of summarising the research from 1990 onwards. So I was interested to see what was the earliest research to which Vickery made reference.

The earliest paper referenced was: Latimer, C. (1899) "Modification of rigor mortis resulting from previous fatigue of muscle of frogs", *American Journal of Physiology* 2, 29. No it wasn't related to a bygone Australian frogs' legs industry. It was included with a body of early American research on meat of which Vickery and others were aware and which no doubt formed a foundation for early meat research in this country. Australian papers listed commenced in 1920s with the earliest being Tiegs, O.W. (1923) "Structure and action of striated muscle fibres", *Trans. Royal Soc. South Australia* 47, 142. Perhaps Tiegs was the first South Australian food scientist.

> *"Food science was recognised by name in the 1960s but by nature it was recognised much earlier"*

Food science before 1900

So what happened before 1900, was it a "world without food science"? Not really, there was some systematic food research but this was limited to food chemists, mainly in Germany and the US. Analysis of food composition developed during the 19th century and was used for controlling adulteration and to some extent measuring nutrients. There was also empirical engineering work on food processing and preservation equipment in many countries, including Australia. Along with this came some government-funded demonstrations of new food equipment. A good example is the Queensland Travelling Dairy which commenced operation in 1899. It moved all over Queensland, demonstrating centrifugal cream separation, which had just been invented, and butter and cheese manufacture. Perhaps this was the first food pilot plant.

Arguably, food science commenced with Louis Pasteur (1822–1895) who was also a chemist. He studied fermentation and postulated the presence of microscopic organisms which may cause disease. He invented the heat treatment "pasteurisation" in 1863, originally for wine but it has been used very successfully for milk for many years.

In 2012, the Royal Society published a list of the 20 most significant food innovations. The top three were:

- Refrigeration
- Pasteurisation/sterilisation
- Canning.

This demonstrates the importance of Pasteur's discovery and the central role of microbiology in food science. Most people would agree that without an understanding of food microbiology, the food industry would be very different. So when we think about a world without food science, we should first contemplate a world without food microbiology.

The top rank for refrigeration would hold true for most of us. It is of interest that work on refrigeration was an important part of the early food research in Australia, mainly because of its use in extending the shelf-life of perishable exported foods, particularly meat, butter and cheese. The first commercial refrigerators became available in 1911, which would have been a godsend for the food industry.

A world without food science

So how do we sum up the implications of a world without food science, using a broad definition of food science for the purpose? IFT has embarked on a public education campaign on the role of food science in ensuring nutritious, safe and abundant food supply entitled "World without Food Science", which was the inspiration for the topic of this address. It has highlighted five implications of a world without food science and produced videos on each of these which are available on the IFT website (www.ift.org). The five identified by IFT are:

- Availability of food
- Food safety
- Sustainability
- Nutrition
- Special foods.

However, there other implications of a world without food science which include:

- Immediacy of consumption
- Inability to preserve and store perishable food
- Inability to distribute food to a large population
- Lack of convenience
- Lack of safety
- Reduced choice
- Lack of predictability
- Lack of flexibility in use of ingredients
- Inability to analyse
- Inability to financially gain from food commerce.

I would like to pick up on a few of these. Of course they are not all independent of each other.

Immediacy of consumption. Many people in the world have no knowledge of or contact with food science. Their food is prepared for immediate consumption, so they have little or no need for information on storage and preservation technologies. At the time I was asked to give this address, I was reading Jon and Jack Faine's book *From Here to There: A Father and Son Roadtrip Adventure from Melbourne to London*. They were driving through very out-of-the-way places in China and central Europe and eating the local food and I started thinking that food science had not come to many of those people. So how do they get on in a world without food science? It struck me that it was the immediacy of consumption which was all-important. There was no need to preserve or transport their processed food for distribution to the masses.

The Faines wrote:

Our fish is lifted from a tub of water, hit on the head with a cleaver and butter-fried in a flash... We learn that freshly killed is the norm in off-the-beaten-track China and no one would consider eating all sorts of animals any other way. Home-style restaurants are typical, the middle-aged woman running a kitchen much as she would at home.

Inability to preserve and store perishable food. The need for preservation and storage is a logical consequence of trade and widespread distribution of food. It is worth recalling that this was a major reason for initiation of major food research programs in many countries. For reliable preservation and storage, knowledge of the science of spoilage is essential. Importantly, the knowledge leads to informed choices of appropriate processing, packaging and storage conditions. Lack of such knowledge leads to poor food quality, poor food safety and considerable food waste.

Food safety. A knowledge of food safety is essential for the modern food industry with its complex processing and distribution system. A good example is raw milk. Some people firmly believe that raw milk has benefits which are not provided by pasteurised milk. While I do not advocate consumption of raw milk, I have to admit I was raised on raw milk as I was brought up on a dairy farm and my parents had no knowledge of pasteurisation as a food safety measure. The keys of course are that the milk I drank was from selected "clean" cows and was not from bulked milk supplies distributed around the country. When milk has to be distributed widely, pasteurisation is essential for ensuring the safety of its consumers.

Lack of convenience. This logically follows from the need for preservation and storage. There is then a need for products to be available at the desired time in the desired form. Packaging and portion control become major considerations. The convenience factor in modern foods is driven by consumer demands and lifestyles and feeds through as a major driver in new food product development. This in turn becomes a major commercial consideration and demonstrates the important link between food science and the modern food industry.

Lack of choice. I am reminded of an advertisement for milk where a customer just wants milk and is confronted with a wide choice of different milks. Such a choice is not uncommon in today's food industry and is something we as consumers generally value. Many of the products are variations based on flavours, package size or nutrition knowledge developed with a knowledge of food science. Again, the choice is consumer driven including that of special foods for consumers with specific health needs as highlighted by IFT.

Lack of predictability. Predictability of what might happen at any stage of the food chain is based on scientific knowledge. It could be argued that this is the main difference between a world with and a world without food science. Much food research is performed for this end purpose. For many food researchers, replication of trials and proper statistical treatment of the results is the bane of their lives. However, this is essential to accommodate natural variation and to give validity to the results so that they can be used for predictive purposes. For example, microbiologically, knowledge of the effects of factors such as water activity, temperature, pH and time on survival and/or growth of bacteria is essential, as is knowledge of the chemical effects of factors such as pH, temperature and time on enzymes, vitamins and degradative reactions.

To put the above points into a practical context consider UHT milk. This product, like many others, would be impossible to produce without food science knowledge. In terms of immediacy of consumption, preservation and storage, convenience, UHT milk is stable at room temperature for several months. Many consumers keep it in a cupboard for convenient use when they run out of pasteurised milk. In terms of safety, the high-temperature processing conditions ensure all pathogens are destroyed. The conditions used for UHT processing have been derived from research and are based on sound food science. In fact the changes that occur in milk during processing and storage are so well defined scientifically that they can be accurately predicted from a knowledge of the relevant times and temperatures of processing and storage.

In conclusion, it is apparent that food science, in all its forms, is the foundation of the modern food industry. It is certainly possible for food to be prepared and consumed without a knowledge of food science, but it is extremely difficult, if not impossible, to provide a reliable, safe, high-quality food supply to large numbers of people through a complex distribution system without invoking food science.

Hilton Deeth is emeritus professor of Food Science at the University of Queensland. This paper is based on the JR Vickery Address presented at the 46th Annual AIFST Convention, Brisbane, 15 July 2013.

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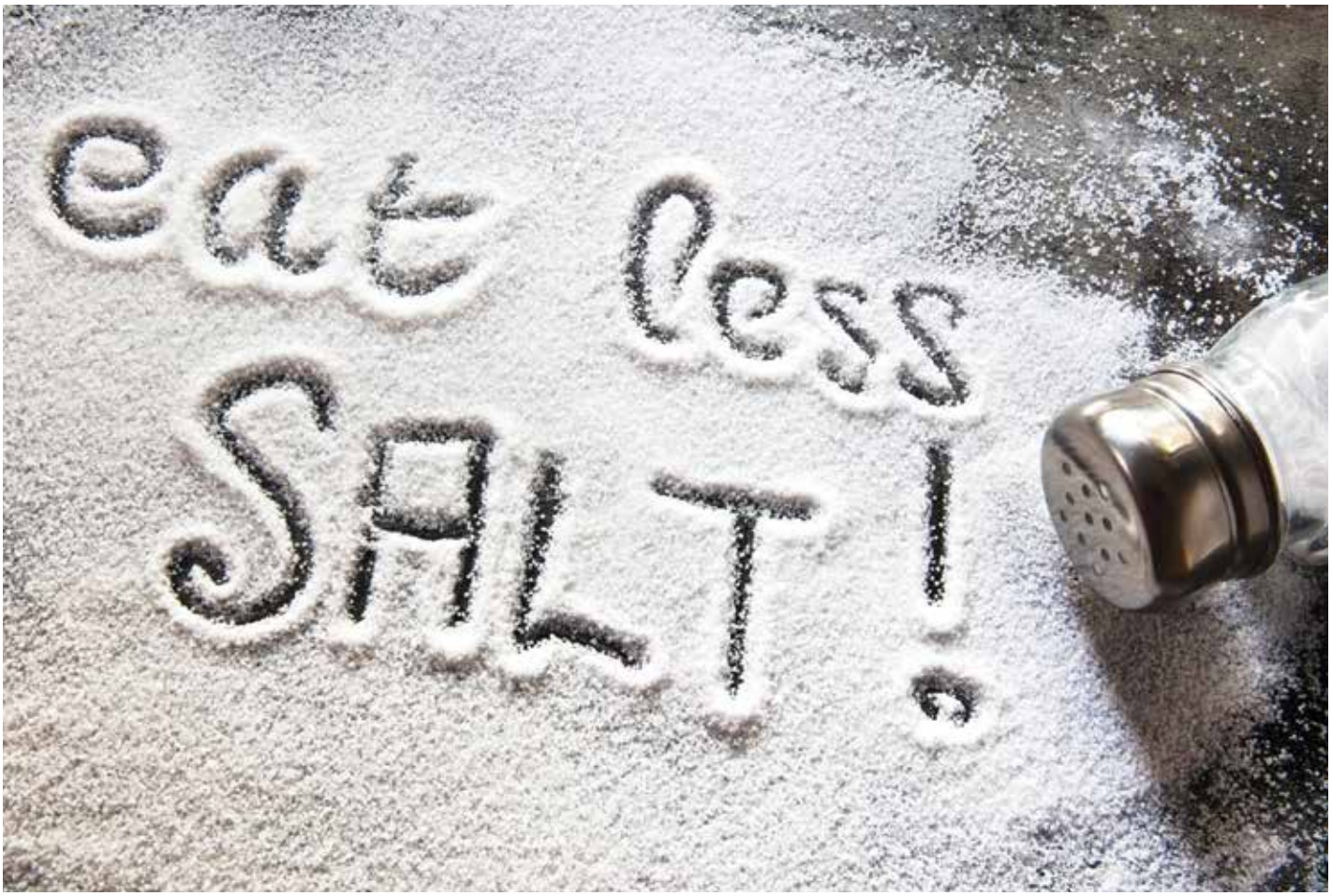
DROP THE SALT LITHGOW

A community-based initiative aims to reduce salt consumption by 10 per cent.

Words by *Mary-Anne Land*



The George Institute for Global Health, with support from Lithgow City Council, is leading a community-based initiative to reduce salt consumption in Lithgow, New South Wales. The program commenced in 2011 with a baseline survey that reported an average population salt consumption of nine grams per day, greatly exceeding the recommended level of four grams per day. This level of salt consumption, however, is not substantively different from that reported in a number of other population groups around the country.

> *"Strong community support for the project is the key to success"*

The "Drop the Salt Lithgow" campaign is aiming to reduce salt intake by 10 per cent.

"Poor diet is now the number one health problem in Australia" according to Bruce Neal, senior director at the George Institute. A recently released report from the World Health Organization, "Global Burden of

Disease Study" also highlighted high blood pressure as the second leading cause of death for the country. "Excess salt consumption is central to both these statistics" he noted, with a large proportion of premature strokes and heart attacks in Australia attributable to these causes. Comparable data from many countries around the world have led the WHO to put salt reduction high on its list of priorities.

Achieving salt reduction in a community is not straightforward but it is widely agreed that the process requires two key elements. First, there needs to be a clear policy on removing salt from the food supply through the reformulation of product lines. This is particularly important in countries such as Australia, where the majority of dietary salt comes from processed foods. Several countries are already taking this approach, although most are using voluntary mechanisms comparable to those implemented by the Australian federal government's Food and Health Dialogue. This is despite studies suggesting that a regulated approach that defines maximum acceptable levels of salt in processed foods could provide health benefits up to twenty times greater.

The second key component is providing consumers with the knowledge and tools required to adopt a healthy diet low in salt. This is the main focus of the Lithgow initiative. The goal is to engage and encourage the local population to seek out lower salt products and thereby drive a new demand for the supply of reduced salt foods in their community.

> *"We have high hopes that we can reduce the average salt consumption levels of the population over the next few months"*

The initiative

A salt swap initiative was launched as part of the Drop the Salt Lithgow campaign in August, with the aim of getting individuals and food retailers in Lithgow to switch from regular salt to Nu-Tek Salt, a reduced sodium salt substitute manufactured by Nu-Tek Food Science. Local bakeries are being encouraged to prepare bread with the Nu-Tek product as part of their efforts to achieve the government's reformulation target for bakery products. Likewise, consumers are being offered free samples of Nu-Tek's "Salt for Life", a sea salt blend which combines natural sea salt enriched with potassium, if they turn in their regular table salt. The product has 70 per cent less sodium than table salt while still retaining good palatability.

''We need to get consumers buying lower salt foods as well'' said Neal, "but the inclusion of the Nu-Tek products as a part of the program has been a great way of raising awareness and for those people adding a lot of salt to their food can be a very effective way of reducing blood pressure".

Strong community support for the project is the key to success according to the research team. The people of Lithgow are already actively engaged in the project through the involvement of the council, local business, the University of Notre Dame Rural Clinical school - Lithgow and community leaders.

Lithgow City Council Mayor, Maree Statham said the council was pleased to be driving such an important project in the community and leading the way in community salt reduction initiatives.

''We have high hopes that we can reduce the average salt consumption levels of the population over the next few months'', Neal said. ''Early next year we will be repeating the surveys that we did at baseline in 2011 and we hope to see a significant drop in the amount of salt people are eating. If this approach works it will be a model that can be used throughout Australia and even overseas", he said.

Mary-Anne Land is a research associate at The George Institute and program manager of Drop the Salt Lithgow.

NEWS FROM THE LAB

Fruit and veg have caught the eye of researchers.

Putting the buzz back in broccoli

There is bad news and good news on the frozen broccoli front.

On the negative side, a team of researchers has found that the process of freezing broccoli removes the vegetable's ability to form the cancer fighting phytochemical sulforaphane.

However, they also have unearthed a way to work around the problem.

The food scientists, from the University of Illinois (US), decided to undertake a study of the nutritional effects of freezing broccoli. Broccoli has been noted for providing cancer-protecting benefits through sulforaphane, which is formed when fresh broccoli is chopped or chewed. However, the team found that the process of preparing fresh broccoli for freezing, which involves blanching or heating to high temperatures, destroys

the enzyme myrosinase. Myrosinase is needed to form sulforaphane, broccoli's cancer preventative compound.

The results of the research, "Commercially produced frozen broccoli lacks the ability to form sulforaphane", were published in the April issue of *Journal of Functional Foods* (doi: 10.1016/j.jff.2013.01.033).

The team followed up the first round of research with another study, which involved blanching broccoli at lower temperatures (76°C rather than the industry standard of 86°C). This resulted in 82 per cent of the myrosinase being preserved.

They also decided to try exposing the broccoli to myrosinase through the use of an external food substance. So they sprinkled 0.25 per cent of daikon radish – which they say is undetectable to taste buds – on frozen broccoli. The radish enabled the myrosinase to make sulforaphane.

"That means that companies can blanch and freeze broccoli, sprinkle it with a minute amount of radish, and sell a product that has the cancer-fighting component that it lacked before," said team member Edward Dosz.

The researchers found that the radish enzyme also worked during microwave heating.

Elizabeth Jeffery, one of the study authors and a nutrition professor at the university, said that she hopes food manufacturers will adopt the new process in order to create frozen broccoli with the same nutritional advantages as fresh broccoli.

Jeffrey also said that in lieu of waiting for food manufacturers to make any changes, consumers could engineer their own nutritional boost by adding another myrosinase-carrying food – such as raw radishes, cabbage, arugula, horseradish, wasabi, watercress or spicy mustard – to their broccoli.

The study, "Modifying the processing and handling of frozen broccoli for increased sulforaphane formation" was published in the *Journal of Food Science*, (doi: 10.1111/1750-3841.12221).

An innovative use of fruit and veg residue

Researchers have uncovered a new option for using superfluous fruit and vegetable residue. A team of Brazilian researchers from the Federal University of Rio de Janeiro decided to try to manufacture new products using leftover but still nutrient-materials.

They focused on using ingredients that were commonly discarded during the manufacture of isotonic sports drinks and based their research on a sample beverage that included a number of fruits and vegetables including orange, passion fruit, lettuce, watermelon, courgettes, spinach, taro and rocket.

The team processed the residue that was not used to make the sample drink into a flour. This was then incorporated into bars and biscuits, using varying levels (20-35 per cent) of the residue-generated flour.

The researchers found that in most cases the residue flour had a favourable result over 90 days, except for inclusion in sweet biscuits. They also reported that the taste results were comparable to normal bars.

The team concluded that the products provided high fibre content, reasonable consumer acceptance and were microbiologically stable.

"The chemical, microbiological and sensorial results of the designed products attested for an alternative towards applying and reducing agro-industrial wastes," the authors noted.

The study, "Formulation and characterization of functional foods based on fruit and vegetable residue flour", has been published in the *Journal of Food Science Technology*, doi: 10.1007/s13197-013-1061-4.

NEWS ROUNDUP

Toppings that stay in place and using old grains to make new products are some of the recent innovations in food manufacturing.

Ancient grains bring new opportunities

Options for adding to the ever-expanding gluten free market continue unabated. In Finland, a team of researchers has developed a method for making gluten free extruded snacks, without negatively impacting expansion and texture, with ancient grains.

The team, from the University of Helsinki, decided to try using amaranth, quinoa and kaniwa as additions to corn-based snacks.

The grains were milled into flour, mixed with an 80:20 ratio of pure corn flour and then retained as separate flours. The flours were then used to make snack bars. The researchers found that all grain flour options improved the sectional expansion and softness of the snacks, with amaranth offering the best expansion potential. Additionally, all options provided a significant level of stability for storage when exposed to relative high humidity.

The researchers used corn flour as it was considered gluten free (it contained less than 22 ppm of gluten) under current EU standards.

"This investigation was a step forward in the understanding and developing of novel gluten-free snack products," the researchers said. They noted that along with being gluten-free, the three grains are also high in protein and fibre.

The study, "Use of amaranth, quinoa and kaniwa in extruded corn-based snacks", was published in the July 2013 *Journal of Cereal Science* (doi: org/10.1016/j.jcs.2013.04.003).

Big players team up

Dairy giant Danone is calling on the extensive retailing experience of Starbucks to help create and promote new yogurt products.

The two companies have signed an agreement to jointly develop a new line

of specialty yogurt which will be sold in Starbucks and other grocery channels. For Danone, the partnership means a new opportunity to expand its presence in the US. For Starbucks, the new products will give the company an opportunity to provide customers with "healthier" products.

The new yogurt items will appear under Starbucks' Evolution Fresh brand and are being honed from Dannons' Parfait Greek yogurt line. Initially, the yogurts will only be sold in Starbucks' stores, with a target launch slated for spring 2014. In 2015, they will join Danone's grocery distribution network for wider distribution; first in the US and the globally.

"Starbucks is committed to evolving and enhancing our customer experience with innovative and wholesome food offerings. Today's announcement underscores this commitment through the transformation of our existing yogurt offerings and our multi-year agreement with Danone," said Howard Schultz, Starbucks chairman, president and chief executive officer.

"With a fast-growing but still low penetration of the yogurt category, the US remains a key growth opportunity for Danone," said Danone CEO Franck Riboud.

New dairy research facility

Dairy Innovation (DIAL) has opened an expanded research facility to help member companies innovate and expand their manufacturing capabilities.

The new facility includes state-of-the-art research labs, a manufacturing pilot plant, new food technology labs and a sensory lab. The organisation hopes that the facilities will allow Australian dairy businesses to discover and deliver innovative dairy products and processes within Australia and in overseas markets.

"Our expanded site will enable us to provide knowledge, capability and crucial services to the industry as well as create opportunities to assist member companies achieve growth in markets in Australia and overseas," said Peter Boyden, the chairman of the group.

Making toppings stick

Food toppings can be rather costly for food manufacturers, as they tend to fall off throughout the manufacturing and distribution process. However, a US company claims to have developed a new method of making the toppings stick, without any negative impacts on the product.

The solution, called Add-Here CSE, has been designed to improve the retention of bakery and snack toppings during manufacture and shipping.

The company that produces the product, TIC Gums, said that adding seeds to bakery products is currently one of the most expensive processes in food manufacturing because of significant seed loss. It says that its new cold water soluble, hydrocolloid product can dramatically reduce the normal topping loss, which can be as high as 70 per cent of the toppings.

The solution works by creating a film that locks the topping into the underlying food product. The applications manager for TIC, Michael Flemmens, said that product works on a range of items, including freeze-dried veggies, seeds and pieces of olives. However, it does not work for salt.

CAROB CULTURE

A fascination with carob has led to a blossoming food manufacturing business.

Words by *Lynn Elsey*

Michael and Jam Jolley could be considered as accidental entrepreneurs.

Around 13 years ago the couple decided to fill a 76-acre block of land in South Australia's Clare Valley with seven different varieties of carob trees, specially selected to yield high quality carob. Michael Jolley had become acquainted with carob while working as a gardener for a South Australian carob grower and was intrigued by the idea of growing superior tasting pods.

As the orchard's 6,000 trees blossomed, the Jolley's were soon awash in carob. Although they had no background in food manufacturing, the couple decided to make food products: "I've got nothing to lose," Michael Jolley explained. So they invested in a range of machinery including a carob kibbler, a roaster and a carob miller and began developing a range of carob products.

Today the Australian Carob Company is the largest commercial carob processor in Australia, producing items for its own consumer range along with supplying external manufacturers with quality carob for food products.

The business structure can best be described as lean. Until recently, Jam and Michael did everything themselves – from nurturing the trees to processing and packaging the carob products. They have recently taken on a part-time assistant in addition to their occasional use of external marketing and web consulting services.

The company produces a range of consumer products including carob syrup, raw and roasted powder, raw kibble nibbles and plain and peppermint buttons. They also sell raw pods and seeds.

Growing the business

"We are the only company in Australia that grows our own carob trees and produces the products on site," Jolley said. The Jolley's follow sustainable farming practices and don't use pesticides or insecticides on the trees or in the orchard. Their carob products are 100 per cent organic and the company is currently going through the organic certification process.

The decision to focus on producing high quality and Australian-made products seems to be paying off. According to Jolley, sales increased nearly 331 per cent in from May 2012 to 2013, and he anticipates even higher returns next year.

"We owe this success to the high quality, cleanliness and consistency of our products. We hand-select every carob pod and maintain control through the entire process, from paddock to plate," he said.

In 2013 the Jolley's harvested around 80 tonnes of carob and expect to double that in 2014. And everything is put to use.

"One hundred per cent of the carob gets used, absolutely nothing is wasted," Jolley said. "When we accumulate enough carob seeds, we will send them to Europe to sell to the LBG gum manufacturers."

Along with direct sales of their products, the company is also working on expanding business by supplying carob to other manufacturers. Woolworths, for example, is now using the company's carob kibble in its Macro Nibble Mix.

> *We hand-select every carob pod and maintain control through the entire process, from paddock to plate*

The consumer-based products are distributed across Australia through a team of distributors and online retailers. The Jolleys' are also exploring export options, especially in Indonesia, India and Thailand.

Carob power

Carob pods, which hang from the tree in branches, take just under a year to mature. The pods are harvested in March and April and dried naturally – to moisture levels of 10 per cent or lower – for processing.

They are then washed and processed in a specially designed machine that turns the carob pods into small chunks of kibble. The seeds inside the fibrous pods are separated and kept aside for additional use. When the kibble is sufficiently dried it can be milled, either raw or roasted, into a powder.

Those of a certain age again may remember carob being promoted as an alternative sweetener and chocolate substitute in the 70s, primarily in the health food market. However, the unusual and sometimes bitter aftertaste in many of the products along with a lack of general market interest in natural sweeteners meant that carob never really caught on.

A natural sweetener, carob is high in protein and fibre and contains numerous vitamins. It has been said to be effective in treating osteoporosis, diabetes and asthma. Carob is commonly used as a natural digestive aid and has been used to combat diarrhoea. It has also been claimed to assist with the absorption of some nutrients and linked to reducing blood sugar and insulin levels and helping lower cholesterol levels.

But although it is a tasty source of health benefits and a natural sweetener, carob is relatively unknown to many Australian consumers. Michael Jolley said that he purposely selected trees that would produce sweeter and better tasting carob to help overcome some of the previous barriers to widespread acceptance. He is also trying to better educate the public about the benefits and uses of carob. With this in mind the company recently launched a recipe contest on its website to encourage people to submit recipes, which is designed to help provide the public with ideas and incentives to cook with carob.

Dreams and realities

Michael Jolley's enthusiasm for creating a business that revolves around carob is inspiring. But what about challenges?

Jolley is quick to admit that obtaining financing for the business has been tricky. Until recently both he and Jam have held jobs outside the carob farm to help support the enterprise.

He also said that the decision to turn his dream into a business had required some rapid lessons in food manufacturing and marketing. And his desire to focus on creating superior carob products certainly has increased the work and stress loads.

"I like to think that all consumers expect the best. And that is exactly what I will give them. There have been many sleepless nights, trying to perfect our products – something that we will never stop trying to achieve, as there is always room for improvement."

Lack of sleep and spare time notwithstanding, there is no doubt that Michael Jolley is delighted with his career choice.

"I love carob and every day pinch myself that this dream has actually come true. This has been an amazing journey over the past 13 years and I am looking forward to the future ahead."

Lynn Elsey is the editor of food Australia.

EYES ON THE FUTURE

Jeremy Betros recently took part in a gathering of future food science leaders in the US.

Words by *Jeremy Betros*

I was selected to represent my company and Australia at Lead 360, a global gathering of 25 future leaders from food science and technology, representing industry, government, academia and research. Convened in Chicago, in conjunction with the IFT annual meeting 13–16 July 2013, the program was designed to bring together a representative international group of dynamic, high potential and passionate food science and technology professionals with the goal of forming an extensive working network.

Encompassing food research and development, innovation and regulatory affairs backgrounds, the diverse mix of delegates came from 14 countries around the globe, including representatives from Mexican, South African and Argentinian food authorities and from global FMCG brands and the food supply industry. The group also included academics from universities across Africa, Asia and the US.

The program started with a leadership assessment of the group and explored our leadership values, individually and as a team, through coaching and facilitation by IFT mentors. The mentors included the IFT president, vice president and board members.

After the leadership introduction, the program proceeded to focus on two main areas:

- To develop ways of improving the profile of food science and technology as a profession
- To discuss food security and ultimately the issue of feeding the expected increased world population of nine billion people by 2050.

The group was lucky enough to have the opportunity to attend several plenary sessions from the IFT annual meeting's technical program, including Fareed Zakaria's session on the "Extreme Challenges Facing Food Professionals" and David Robson's lecture on "Food, Water and Energy Nexus".

We were also invited to attend and participate in the "Power of 3", a strategic meeting that focused on food security and the role of food, water and energy. The issue of sustainability and how food science can help feed the world's growing population with less available natural resources was a common theme throughout the program.

Looking ahead

Although the group was challenged to solve complex issues such as global food security and how to feed nine billion people, these were obviously beyond the scope of 25 participants. However, the group did agree on a common definition of purpose:

- To build an active community of future food technology leaders who engage in global networking and knowledge exchange
- To take an active leadership role as a key stakeholder group (young professionals) in IFT activities and strategy development.

The group decided the following four action points were critical to achieving its goal:

- Keep the Lead 360 program going
- Convene a panel discussion on food security for the 2014 IFT convention to bring together experts to deliberate on this issue
- Prepare some edgy case studies to enhance the profile of food science and technology
- Work with IFT on a recruiting video for food science and technology, edited to appeal to a younger generation to attract talent. This could also extend to an educational video on food security, not unlike IFT's "World without Food Science" and "Day in the Life of a Food Scientist".

Work is currently being divided up on these tasks through the Lead 360 Facebook community, and discussions are being planned through web meetings for further action.

Conclusion

By bringing together a group of emerging leaders in food science the program helped to improve global communication. It also allowed the young food science professionals to understand the importance of being able to tell a story and the need as individuals to build credibility for food science and technology as a profession.

Planning needs to continue to extend the Lead 360 program to ensure up and coming leaders have a voice in the industry and that the good work started this year is not lost.

Special thanks to the AIFST, Flavour Creations and IFT for providing this incredible opportunity.

Jeremy Betros has 11 years' experience as a food technologist and is currently the head of technical/R&D Manager at Flavour Creations in Brisbane.

GLOBAL ROUNDUP

A quick look at training and employment in the global food industry.

Nigerian farmers receive cocoa training

An innovative program designed to help cocoa farmers improve the quality of their cocoa, productivity and income is now expanding.

The "Hershey Learn to Grow" program has been running in Ghana since 2012 with aims of helping African cocoa farmers and providing Hershey with a source of 100 per cent certified cocoa by 2020.

The program, which is being underwritten by a public and private partnership between Hershey and IDH (The Sustainable Trade Initiative) and Source Trust, is now expanding to Nigeria. The goal is to provide 20,000 Nigerian cocoa farmers with advanced training to help improve their lives and incomes while helping Hershey source sustainable cocoa.

The Nigerian training program will include education on using computerised cocoa tracking systems throughout the supply chain, which will help provide the farmers with

better information about their farms and businesses, including better use of fertilisers and details on the age of their trees. The program also will provide improved water and power provision and malaria prevention.

"We are very pleased and proud to partner with Hershey and Source Trust in this ambitious program that aims to strengthen the entrepreneurial skills of cocoa farmers in Nigeria by boosting their productivity," said Jonas Mva Mva, senior program manager cocoa at IDH. "This project will create impact at scale and can serve as a model for cocoa development in Nigeria."

Salaries and work hours on the increase for Aus food scientists

Salaries for members of AIFST grew by an average of 3.9 per cent to May 2013 according to a recent survey.

The survey of AIFST members, which was generated from an APESMA/STA 2013 professional scientist remuneration survey, also found that 18.4 per cent of full time food science employees received no salary increases in the preceding year and 43 per cent received less than 3 per cent increases.

The growth in salary seem to come with a price – 18.1 per cent of the respondents reported they were now working longer hours. The average number of hours worked was 45.2 per cent, with 13.5 per cent working more than 50 hours per week. And 64.4 per cent said they did not receive additional compensation for work beyond their normal mandated hours.

The study also found that 12.8 per cent of respondents were undertaking further study.

For overall remuneration, those working in Western Australia had the highest average base salary, $108,386, closely followed by Victoria, $107,311.

The study was based on 307 responses from AIFST members.

Report available at www.aifst.asn.au.

Michigan not singing the blues

Although the state of Michigan and its famed Motown (Detroit, which is now in bankruptcy) have become vibrant symbols of the decline of manufacturing, the industry is making a comeback – with food at the helm.

From December 2009 to March 2013 the state topped the US list for creating manufacturing jobs, helping reduce the state's unemployment level to 8.5 per cent. The food sector, including manufacturing, has been credited as a key factor in the state's rapidly improving economy according to Mike DiBernardo from the state's department of Agriculture and Rural Development. Within the sector, the food and agriculture industry grew by $US20bn from 2009 to 2012 and is now credited with providing more than $91bn in economic activity a year, with food processing along generating around $US25b.

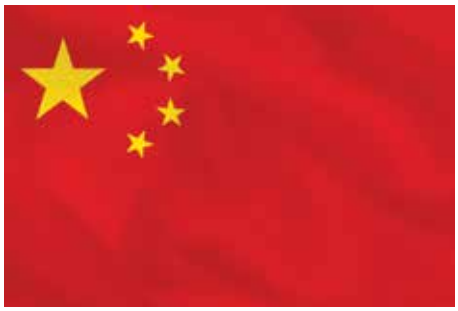
"Michigan has undergone a transformation over the past couple of years", said Steven Hilfinger, executive VP and COO at the Michigan Economic Development Council.

"The governor has worked hard with the legislature to improve the business climate here and in the last four years, over 200,000 new jobs were created in the state. And food and agriculture is one of the key industries we have been charged to grow and help support."

FUNCTIONAL FOODS ROUNDUP

Opportunities for dairy products in China and the continuing growth of the gluten free market are making waves.

Words by *Ranjan Sharma*



Market trends – All dairy roads lead to China

As far as market opportunities for dairy products are concerned, China seems to be the new battleground for dairy. The current boom in demand has triggered intense competition among key dairy exporters, including those trying to meet the insatiable demand in the infant formula sector.

According to the USDA, local milk production in China is on the rise thanks to improved breeding and feed nutrition programs in collaboration with foreign companies. However, the increase in the domestic production is nowhere near what is needed to meet the demand for dairy products. For example, between 2011 and 2012, imports of skimmed milk powder to China grew by 49 per cent and are expected to increase an additional 18 per cent this year.

Dairy prices are also likely to stay high in the near future, thanks to the decline in the production volumes in key exporting countries. This year milk production in key exporting countries Argentina, Australia, the European Union, New Zealand and the US has fallen nearly three per cent due to a series of unfavourable weather conditions. These included a cold spring in the Northern Hemisphere and a drought that dried up production in New Zealand, the top exporting country.

China's quest for overseas infant formula – the result of a deep distrust of domestic supply dating back to a deadly melamine contamination scandal in 2008 – has been embraced by several European and Australasian companies. To build confidence in the local products, the Chinese government is planning to consolidate the number of manufacturers and cut the number of suppliers by one-third this year. Companies that produce infant formula will also be required to have their own dairy farms, a challenge to local suppliers.

According to Euromonitor, the demand for foreign brands in the Chinese infant formula market is projected to double in value to US$25 billion by 2017 due to the growing female workforce, which has created a reduced incidence of breast feeding. According to UN, with 82 million children below the age of five and only 28 per cent under the age of six months being breast-fed, demand for infant formula is likely to stay high despite recent efforts by Chinese government to encourage breast feeding. Euromonitor predicts that by 2017, China will represent nearly 50 per cent of global demand for infant formula.

China's high demand for dairy

products comes as a shot in the arm for the European dairy farmers whose milk quota system comes to an end in 2015. Australasian dairy companies are also gearing up to capture an increased share of the infant formula market. Here is a summary of Australian and New Zealand actions directed at the Chinese dairy industry:

- Riding on the clean, green image of New Zealand, Hokitika-based Westland products recently launched a range of infant formula products in China. Marketed under the brand Westpro Nutrition, the range currently includes base powders for Infant Formula (Stage 1), Follow On Formula (Stage 2) and Growing Up Milk Powder (Stage 3) as well as other powders for nutritional applications.
- Australian co-operative Murray Goulburn has secured a five-year deal with Danone to supply Asia's increasing demand for Growing Up Milk Powder. Murray Goulburn will spend $2.5 million on equipment upgrades at its Koroit site to meet the demand of 50,000 tonnes of milk powder product for young children in China and South East Asia. Earlier this year Murray Goulburn made an investment of $19.1 million in its Leongatha facility in Victoria to lift the site's Ultra High Temperature (UHT) milk manufacturing output by approximately 70 million litres a year, to meet the growing demand from China and South East Asia.
- Bega Cheese has committed to building a nutritional powder blending and packing facility as it looks to capitalise on strong Chinese demand for infant formula. The new plant will be commissioned early next year at Tatura and will be able to blend and package up to 15,000 tonnes of canned nutritional powders annually.
- New Zealand company Synlait, which is partly owned by the Chinese company Bright Foods, recently raised NZ$120 million to expand nutritional powders production to meet the demand in China.
- A smaller Australian company, Burra Foods, is planning to spend $20 million building an infant formula processing plant at its site at Korumburra in South Gippsland. The company plans to export 10,000 tonnes of infant formula per year from 2014, mainly to China and neighbouring countries.
- A $40 million joint venture between Australian Consolidated Milk and Freedom Foods Group, aimed at producing UHT milk at Shepparton in northern Victoria, was announced earlier this month.

> *"10 per cent of the population is now following a gluten-free diet"*

Thus, it is obvious that China is going to be the key driver for the growth of the global dairy industry in the near future, especially for companies in Australia and New Zealand, with products such as infant formula and UHT milk.

Consumer trends - Gluten-free goes mainstream

A few years ago, gluten-free products were only available through health stores. However, over the last five years things have changed. Gluten-free products are becoming mainstream, thanks to increased awareness of coeliac disease. Coeliac disease, which is an autoimmune disorder triggered by the consumption of gluten-containing foods, can lead to extensive damage in the small intestine of susceptible people. At present, there is no cure for the disorder other than following a gluten-free diet.

Manufacturer and consumer awareness of the disorder is increasing – to a point where some consumers even consider gluten-free food products to be healthier than conventional products. The growing variety of retail gluten-free products and continual improvements in new product development by food manufacturers are also helping contribute to the growth in this sector.

Datamonitor reports that consumers with an interest in gluten free are not only influenced by the gluten-free claims but are generally also healthier eaters who claim to be more ethical, experimental and more influenced by natural and organic ingredients than the average global consumer. According to the market research company, North American consumers in the age groups 50–64 and 25–34 are most likely to be influenced by gluten-

free marketing. And it seems males are more influenced by gluten-free marketing and claims than females.

According to market research company Markets and Markets, the global gluten-free product market is experiencing growth of over 10 per cent per year and likely to reach a value of US$6.2billion by 2018. Among the gluten-free products, bakery and confectionery products form the largest volume share in the market, about 46 per cent, followed by gluten-free snacks that form about 20 per cent. The US market represents over 50 per cent of the global share of the market and continues to be one of the fastest growing markets. Estimates for the market size of gluten-free products in the US vary by source. For example, Euromonitor suggests a market value of US$1.35bn in 2011 whereas Leatherhead Food Research estimates the value at US$2.7billion in 2013.

The UK market also has a rapidly growing demand for gluten-free products. The gluten-free sector is the largest within the UK market for "free-from" foods, targeted at people with food allergies or intolerances. Although estimates vary, it is one of the most dynamic sectors in the UK food industry. According to IRI, UK sales of gluten- and wheat-free foods reached approximately US$180 million in 2012 while Kantar Worldpanel values the market at over US$200 million. Sales of gluten free products in UK are thought to have increased by 23 per cent within the last year alone.

In Australia

According to Australia's Allergen Bureau, the gluten-free market in Australia continues to grow. Datamonitor forecasts that the Australian gluten-free market will increase over the next five years to a total of US$98.6 million. Coeliac disease is thought to affect more than 1 per cent of the Australian population, although it is possible that as many of 80 per cent of those afflicted haven't been diagnosed. However, research from Coeliac Australia indicates that 10 per cent of the population is now following a gluten-free diet, while Datamonitor information indicates 18 per cent of Australians are avoiding certain foods due to perceived allergies and intolerances.

The awareness of gluten-free products in Australia is on the rise. Recently, health insurance company Bupa, in association with The George Institute, launched a consumer friendly filter on food scanning app, FoodSwitch. The GlutenSwitch is designed to help gluten-intolerant consumers make healthy food choices. By scanning the barcodes of packaged foods with smartphones, GlutenSwitch provides users with an instant indication if the product contains gluten, as well as other health information such as fat and salt levels.

Last month the US FDA recognised the need for streamlining gluten-free labelling of food products by standardising the definition for "gluten-free" claims. In the US, in order to use the term "gluten-free" on its label, a food must contain less than 20 ppm of gluten. The rule also requires foods with the claims "no gluten," "free of gluten," and "without gluten" to meet the definition for "gluten-free." Food manufacturers will have a year after the rule is published to bring their labels into compliance with the new requirements. In Australia, under Food Standards Australia New Zealand (FSANZ) regulations, a product that carries a gluten-free claim must not contain any "detectable gluten" (see editorial, page 5, for further coverage of this topic).

The new definition is currently being challenged by Australian Food and Grocery Council (AFGC) who has proposed that a product with up to 20 ppm gluten be allowed to have gluten-free label claims. Although FSANZ has not yet made a decision, AFGC has support of Coeliac Australia, a consumer voice for coeliac disease. Bearing in mind that US has recently defined upper limit for gluten-free labelling as 20 ppm, which is at par with the EU food labelling, it seems likely that Australia will adopt the AFGC recommendations.

Ranjan Sharma is the editor of Functional Food Weekly, www.functionalfoods.biz.

Note: At the time of going to print, the application had not been presented to FSANZ.

NEW ZEALAND: 80 PER CENT PURE?

The country's clean green sheen continues to lose its lustre as some of the biggest players in the food industry are caught up in more food safety dramas.

Words by *Lynn Elsey*

> *News of China's temporary ban on the whey and dairy base powder caused the New Zealand dollar to drop by more than one per cent*

New Zealand's dairy industry continues to come under fire for food safety problems, as the country's top two producers are entangled in highly visible food safety issues.

On 2 August Fonterra announced that three batches of a specific type of whey protein concentrate had been found to potentially contain *Clostridium botulinum*. Fonterra announced that it would remove more than 1,000 tonnes of the product, which had been used to manufacture Karicare infant formula, which is made by Nutricia. The company said that the products had been exported to China, Australia, Malaysia, Vietnam, Thailand and Saudi Arabia.

Following the news, China temporarily banned the import of whey powder and dairy base powder (a whey-based ingredient dairy ingredient used in the manufacture of infant formula) from Fonterra.

Then, near the end of August, New Zealand's second largest dairy producer, Westland Milks Products, reported that milk products with above-normal levels of nitrate had been exported to China. Excessive amounts of nitrate can impair oxygen's delivery through the blood supply.

Chinese authorities seized 390 kilograms of Westland's milk protein lactoferrin, a milk extract used in food products including infant formula and yogurt, after discovering the high nitrate levels. Apparently, the high nitrate levels were not detected in New Zealand prior to export to China. According to Westland, the high nitrate levels occurred following a failure to completely flush out cleaning products used at the company's manufacturing plant.

The response

New Zealand's agriculture ministry said that the levels of nitrate detected weren't a health hazard. "Any food safety risk to Chinese consumers is negligible because the quantities of lactoferrin used in consumer products was very small, meaning the nitrate levels in those products would easily be within acceptable levels," said Scott Gallacher, acting director general for New Zealand Agriculture.

Nonetheless, the Chinese authorities said that they would now require all New Zealand companies supplying China with lactoferrin to provide nitrate test reports to ensure consumer safety.

New Zealand's Ministry for Primary Industries announced on 19 August that it had cancelled export certificates for the Westland dairy product.

Following the latest food safety mishaps, New Zealand's Prime Minister John Key stepped in to assure the public that the milk products in question were not a food safety threat. He also said that the Westland matter would be investigated.

Keeping an eye on the market

Dairy is New Zealand's biggest export, valued at around $NZ11.3 billion. In 2012, New Zealand's exports to China amounted to around $6 billion, with the dairy industry accounting for around 37 per cent of the total. The milk powder segment of dairy was around $1.38 billion.

It has been estimated that the suspension or loss of the New Zealand's milk powder business to China would cause a drop of 3.3 per cent of the country's total overseas export business. Just the news of China's temporary ban on the whey and dairy base powder caused the New Zealand dollar to drop by more than one per cent.

To date, Fonterra's response to the food safety crisis has included job losses and suspensions, including the resignation of Gary Romano, the company's NZ Milk Products managing director. The company also has formed a board-level committee to look into the contamination issue.

On 28 August, after undertaking another round of testing, New Zealand's Ministry for Primary Industries found that there was no presence of *Clostridium botulinum* in Fonterra's whey protein concentrate ingredient and the products made with it, including infant formula.

Fonterra quickly issued a release, including a statement from company chief Theo Spierings, stating that although the company was relieved that there was no contamination, the recall had been the appropriate action to take.

"Food safety remains our number one priority. The original results from AgResearch indicated the presence of toxin producing *Clostridium botulinum* in the affected whey protein concentrate and we could therefore not take any chances," he said.

"We have just learned of the further and definitive test results. While we share a sense of relief about them, this in no way lessens our commitment to undertaking a thorough review into what happened, and to learn from this experience.

"The past few weeks have been very difficult for parents in a number of countries, as well as for our customers, our farmers, and our staff," Spierings said. However, "given the same circumstances, and with food safety always front of mind, I would do the same again."

"Food safety and quality must always remain our top priority. I have created a new role of Group Director, food Safety and Quality that reports directly to me."

Spierings also said that the news would not impact the various reviews and inquiries already underway, as the company was committed to learning from and sharing any information about ways to improve their safety processes.

Lynn Elsey is editor of food Australia.

NEWS ROUNDUP

Cocoa enhanced packaging found to fight pathogens and a food fungus linked to AIDS are making headlines in the world of food safety.

Food fungus linked to AIDS

A fungus that coats stored corn, wheat, rice and nuts may be helping worsen the AIDS epidemic in developing countries according to new research.

A team of scientists, headed by Pauline Jolly (School of Public Health at the University of Birmingham, Alabama, US), has published a paper that found that food stored in countries near the equator are contaminated by *Aspergillus flavus* and *A. parasiticus* fungi. The fungi produces a toxic substance, aflatoxin, which has been already been linked to liver damage and related cancers.

The research team found a link between HIV viral load and aflatoxin exposure.

"Our work suggests study that aflatoxin exposure may be taking an even greater toll in areas where millions are infected with HIV, including Africa and Asia, the latter with a fast growing HIV population and rice storage areas contaminated by fungi," Jolly said.

The team studied 314 people in Ghana who had been identified as HIV positive but not received any antiretroviral therapy. After dividing the subjects into groups based on levels of aflatoxin exposure, they found that those in the highest exposure group were 2.6 times more likely to have a high HIV viral load than those in the lowest group.

A high viral load leads to higher rates of HIV transmission.

The study, "Association between high aflatoxin B1 levels and high viral load in HIV-positive people" has been published in the *World Mycotoxin Journal* (doi:10.3920/WMJ2013.1585).

"We have done a series of studies now confirming a link between HIV viral load and aflatoxin exposure, but the problem has not yet been recognized or addressed," Jolly said. "A fungal contribution to HIV transmission will only be proved once and for all by larger randomised studies for which there now is no funding. The scientific and world health communities need to decide soon whether or not this question is worth answering."

Electric nose sensor

A new sensor that can detect airborne toxins in the global food supply is being fine-tuned for commercialisation after nearly a decade in development.

The "electronic nose" sensor was developed by an engineering professor Nosang Myung at the University of California Riverside. The technology uses a nanosensor array that can detect small quantities of harmful airborne substances, down to the parts per billion level.

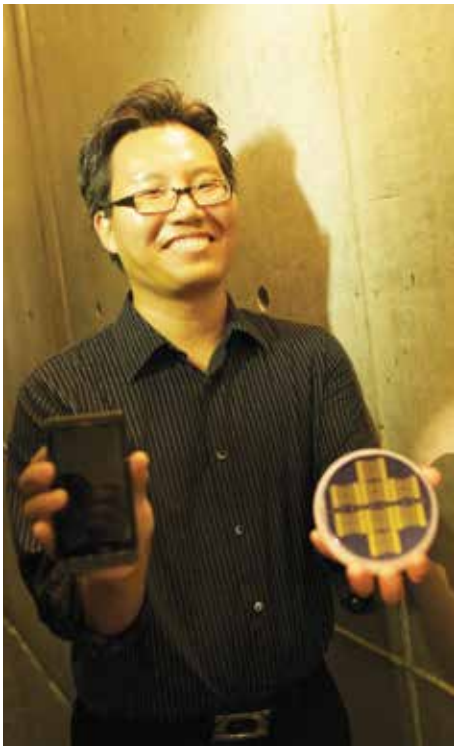
Myung is working with a commercialising platform, ieCrowd, to develop a customised product for food safety and potency measurements. The team is aiming to produce an array that is no larger than a credit card for detection of up to eight toxins. They are also working on a single-channel sensor that could be the size of a fingernail.

"This collaboration will, when successful, usher in a new era of transparency and efficiency for measuring the level of pesticides and

other chemicals in plants we use for food and medicine," said Stephen Abbott, president of Nano Engineered Applications, which owns ieCrowd.

"Our work will also make the technology available to a broad number of applications that are important for a range of new and existing industries globally."

The technology is being designed to be incorporated into a number of platforms, including handheld devices, wearable devices and smartphones.



Nosang Nyung and his nanosensors

New Global Food Traceability Center

The US Institute of Food Technologists (IFT) has launched a new food traceability centre to help protect and improve the global food supply. The organisation said that the centre will lead to information that will help companies improve their ability to trace the path of products throughout the supply chain, helping minimise risk, negative health consequences and economic impacts.

"We will create a focal point where industry, academic institutions, government, foundations and consumer groups can discuss, collaborate, conduct research, adopt best practices and implement practical and actionable traceability solutions for the food system," said Barbara Byrd, the executive vice president of IFT.

The centre will aim to cover all aspects of the food system and to accelerate the adoption and implementation of practical solutions for tracing food across an increasingly complex global food supply chain.

Sponsors of the centre include Cargill, the Food Marketing Institute, GS1 US, Mars and Wal-Mart.

Germ busting cocoa

Researchers have developed a packaging film containing flavonoid-rich cocoa that they claim inhibits the growth of bacteria.

The scientists, from the Institute of Agrochemistry and Food Technology, Paterna, Spain, said that the film not only worked as an antimicrobial against *Listeria, E.coli* and *Salmonella* but also worked as an antioxidant.

The team developed the film from an ethylene-vinyl alcohol copolymer that contained cocoa extracts, derived from a powder with eight times more epicatechin and procyanidin content than normal cocoa. They then tested the film in an infant formula package.

They found that the film released a sufficient amount of an active compound, mainly catechins from the cocoa, to completely inhibit the growth of all microorganisms tested.

They said that the films could be used as a coating on milk packaging, where the release of the active agents could produce a greater protection against microbial contamination and could even extend the product's shelf life.

"The film would also have the added value of producing an antioxidant effect," the authors also noted.

The study was published in the August issue of *Food Chemistry* (doi: 10,1016/j.foodchem.2013.01.097).

NUTRITION WATCH

What's new in nutrition? The following research has been recently published.

Words by *Dr. Ramon Hall*

Dairy intake associated with improved muscle health and mobility in elderly

In a recently completed study at the University of Western Australia, researchers found that a higher dairy intake in older women was associated with larger, stronger muscles and better mobility (Radavelli-Bagatini *et al.*, 2013). Their cross-sectional study of 1,456 women aged 70 to 85 years assessed intake of core dairy foods (milk, yoghurt and cheese) and split the women into three groups: Group 1 (≤1.5 serves of dairy a day), Group 2 (1.5 to 2.2 serves of dairy a day) and Group 3 (≥2.2 serves of dairy a day). The women's muscles mass was determined using dual-energy x-ray absorptiometry (DEXA) and strength and mobility were assessed using hand grip strength and time up and go tests respectively. Data was also collected on the incidence of falls within the three months prior to the study.

The study found that women who had the highest dairy intake (≥2.2 serves a day) had a higher lean body mass, greater arm and leg muscle mass, greater hand grip strength and better performance on the time up and go test compared to those consuming (≤1.5 serves of dairy a day). The prevalence of falls in the previous three months was lower in women with higher dairy intakes; however this was not statistically significant.

The new 2013 Australian Dietary Guidelines recommend women over 50 years of age and men over 70 years of age consume four serves of dairy a day. One serve of dairy is equivalent to either: 250g of milk, 200g of yoghurt, 40g of cheese, 120g of cottage and ricotta cheese.

The study may have implications for the aging Australian population in that increased dairy intake could be helpful as part of a strategy to maintain healthy muscles and to keep older Australians mobile and independent for longer.

Radavelli-Bagatini *et al.* (2013) "Association of Dairy Intake with Body Composition and Physical Function in Older Community-Dwelling Women", *Journal of the Academy of Nutrition and Dietetics*, published online 5 August 2013 (doi: 10.1016/j.jand.2013.05.019).

Beetroot bread improves vasodilation and diastolic BP

Researchers from the University of Reading in the UK have shown that the incorporation of beetroot into bread can reduce diastolic blood pressure and increase endothelium-independent vasodilation in a group of healthy men (Hobbs *et al.*, 2013).

In a randomised controlled cross-over design trial, 23 healthy male participants consumed two different breakfasts: one containing 200g of bread incorporating 100g of beetroot (containing 1.1 mmol nitrate); and the control treatment containing 200g of standard white bread. The primary outcome measurement was microvascular vasodilation. Other measures undertaken included arterial stiffness and ambulatory blood pressure over a six-hour period post-meal. The study also monitored plasma and urinary nitrate and nitrite to help explain the results.

The study found that the addition of beetroot to the bread significantly increased the overall endothelium independent vasodilation and lowered diastolic blood pressure, but did not have an impact on systolic blood pressure in the post-meal period. These changes in vasodilation and diastolic blood pressure are seen as potentially cardio-protective. The beneficial changes in vasodilation and blood pressure were mirrored by increases in plasma and urinary nitrate and nitrite.

Dietary nitrate from vegetables such as beetroot has been previously reported to have beneficial effects on blood pressure through the reduction pathway from nitrate to nitrite to nitric oxide (sometimes referred to as an endothelium-derived relaxation factor).

Epidemiological research has also linked increased vegetable consumption to reduced risk of CVD and beneficial effects on blood pressure. While these effects have been mainly attributed to the antioxidant components of vegetables, there is now growing evidence supported by this study that nitrate may play an important role in the protective effect of vegetables on CVD.

The authors concludes that "bread containing beetroot may serve as an effective vehicle to increase consumption of cardio-protective beetroot in the diet." They acknowledge that "further studies are needed to assess the longer-term effects of beetroot ingestion on blood pressure and vascular function, particularly in groups at risk of CVD."

Hobbs *et al.* (2013) "Acute ingestion of beetroot bread increases endothelium-independent vasodilation and lowers diastolic blood pressure in healthy men: a randomised controlled trial". *Journal of Nutrition*, 143 (9), 1399-1405 (doi: 10.3945/jn.113.175778).

Larger breakfast and smaller dinner may assist weight loss

A study undertaken at Tel Aviv University in Israel has provided initial evidence that a higher calorie breakfast and smaller dinners may be a helpful addition in the management of obesity and metabolic syndrome (Jakubowicz *et al*., 2013).

The aim of the study was to compare a weight loss diet with high calorie intake at breakfast with an isocaloric diet with high calorie intake at dinner.

A total of 93 overweight and obese women with metabolic syndrome participated in this 12 week randomised controlled parallel design dietary intervention trial. The two weight loss diets were both calorie matched (~1400 kcal/day) with the higher energy breakfast diet having (700kcal breakfast, 500 kcal lunch, 200 kcal dinner) and the higher energy dinner diet having (200kcal breakfast, 500 kcal lunch, 700 kcal dinner).

The study found that women on the higher energy breakfast diet lost significantly more weight, had a greater reduction in waist circumference, had lower plasma glucose and insulin levels and better insulin sensitivity than women on the dinner diet. The appetite hormone ghrelin was lower on the breakfast diet which was corroborated with lower subjective hunger and higher subjective satiety.

The authors speculate that the differential effects of these two isocaloric regimes may be in part due to diet-induced thermogenesis being higher in the morning and decreasing throughout the day and into the night.

These interesting results may have implications for dietary advice to overweight, obese and pre-diabetic individuals and may also create opportunities for specific convenient food products pitched to help consumers make breakfast a more substantial meal.

Jakubowicz *et al.* (2013) "High Caloric Intake at Breakfast vs. Dinner Differentially Influences Weight Loss of Overweight and Obese Women" *Obesity*, published online 20 March 2013 (doi: 10.1002/oby.20460).

Does water consumption affect body weight?

Researchers from the Charité University Medical Center Berlin, Germany have undertaken a systematic review to investigate the relationship between water consumption and body weight. Eleven original studies and two systematic reviews were considered from the 4963 records retrieved. The aim of the review was to consider studies in adults over 18 years of age that reported on the association between daily water consumption and any weight-related outcome, including body weight, body mass index or other body weight classifications.

The results showed that in studies where individuals were dieting for weight loss or weight maintenance increased water consumption had a positive weight loss effect. However, in general mixed-weight populations there was no clear effect of increased water consumption on body weight.

The authors concluded that the level of evidence for the association between water intake and body weight is still low, as there are currently a lack of high quality studies and that more research is required.

Muckelbauer *et al.* (2013) "Association between water consumption and body weight outcomes: a systematic review". *American Journal of Clinical Nutrition*, 98(2):282-99. (doi: 10.3945/ajcn.112.055061).

Consumption of dairy inversely associated with diabetes risk

A recent systematic review and meta-analysis conducted by a joint UK and Norway research team has suggested that consumption of dairy products is inversely related to risk of type 2 diabetes (Aune *et al.*, 2013).

The systematic review included seventeen cohort studies (considering 426,055 individuals and 26,976 type 2 diabetes cases) and 15 of the studies were used in the dose-response meta-analysis.

The results revealed a significant non-linear association between total dairy product intake and type 2 diabetes with the relationship suggesting that most of the benefit may be related to increasing intake from low amounts up to 300-400 g/day. The study also showed a significant inverse association for low fat dairy products and cheese and risk of type 2 diabetes.

These findings further support the evidence statement in the current Australian Dietary Guideline (2013), stating that "consumption of at least one and a half serves of dairy foods (milk, yoghurt, cheese) per day is associated with reduced risk of type 2 diabetes."

The authors identified several potential components that could help explain the inverse association between dairy products and type 2 diabetes. They noted that dairy foods are important sources of dietary calcium, vitamin D (in countries that fortify dairy with vitamin D), protein and magnesium and highlighted that each of these has been independently linked to beneficial changes to biomarkers related to type 2 diabetes, such as reduced body weight and increased insulin sensitivity.

In Australia and around the world, type 2 diabetes is increasing rapidly and estimates suggest that global diabetes numbers will exceed half a billion people by 2030. Although diet is recognised as an important factor in the incidence of type 2 diabetes, few dietary factors have been clearly established as risk factors for type 2 diabetes.

This systematic review and meta-analysis provides evidence suggesting that dairy foods may be helpful and protective against the development of type 2 diabetes. As indicated by the authors, further additional studies should assess the associations between other specific types of dairy foods products and the risk of type 2 diabetes and adjust for more confounding factors.

Aune *et al.* (2013) "Dairy products and the risk of type 2 diabetes: a systematic review and dose-response meta-analysis of cohort studies" *American Journal of Clinical Nutrition*, published online 14 August 2013 (doi: 10.3945/ajcn.113.059030).

Dr. Ramon Hall is manager of the Dairy Health and Nutrition Consortium at Dairy Innovation Australia and is an Honorary Research Fellow at the School of Exercise & Nutrition Sciences, Deakin University.

THE ASIA PACIFIC FOOD INNOVATION CONFERENCE

Many innovative ideas across the Asia Pacific region were on offer during a Perth-based conference.

Words by *Susanna Morley-Wong*

On 11 June 2013 Perth welcomed over 90 delegates to the Asia-Pacific Food Innovation Conference with picture-perfect blue skies and bright autumn sunshine. The event was organised by the University of Western Australia in partnership with DAFWA, Curtin University and AIFST.

The aim was to open a broad dialogue on food strategies between innovators, technologists, academics, professional associations and government agencies while focusing on a culture of support and interaction with a keen eye on future markets and sustainability.

Climate scientist Richard Warrick, from the International Institute of Agri-Food Security at Curtin University, opened the conference with a "Bigger Picture" keynote address. He discussed the implications of climate change on the food industry in Australia, from the troposphere to the Western Australia wheat belt region, where reducing risks from rapid climate change now would benefit farmers in the long run.

Alexandra McManus, Centre of Excellence for Science, Seafood and Health at Curtin University, then discussed consumer perceptions of product quality. She said that most consumers are unaware of the difference between various labeling

terms such as "refreshed, snap frozen and frozen as caught" and suggested this could be part of the reason most do not eat the recommended amount of seafood.

Keynote speaker Stuart Johnson of Curtin University presented the first paper in the functional foods session. He suggested the traditional Australian feed crop sorghum, which is high in antioxidants and has slow starch digestibility, could be transformed to a super snack food through the application of extrusion technology to solve future food and health issues.

Karen Reid, Brownes Dairy, and Sue Daubney, Bannister Downs Dairy Company, presented two quite different but equally effective systems of innovative thinking during the dairy innovation session. The documented, methodical and reproducible system employed by Brownes includes travelling to research global trends. The Daubney family, however, has come up some of its best ideas while sitting around the kitchen table or by responding to a family member's request. Both speakers agreed that commitment to innovation is key and that it must become an intractable part of a company's culture.

Ashwini Gengatharan of Monash University Malaysia discussed methods to extract Betalain from dragon fruits and cacti as a healthy and food-process stable red food colourant.

Melvin Gay, Waters Pacific, spoke about convergence chromatography and Sean Clearkin, Silliker, discussed innovative packaging methods, in the technical innovations updates.

Day Two

Although the glorious Western Australia sun was still shining, the second day's theme of "Solutions For Industry" drew the delegates back in to the conference room.

The session on West Australian success stories began with a fisherman's tale from Peter Jecks of Abacus Fisheries, who said he was dumping up to 3,000 tonnes of his annual crab catch because it did not match quality expectations. He realised that survival meant adding value to the waste. Taking inspiration from the Asian practices of eating every possible part of an animal, Jecks developed systems to recover meat from claws and legs and to produce a gourmet crab stock while reducing the water used in the automatic crab cookers by 90 per cent.

Stan Kailis of UWA explained how co-operating olives growers developed a self-regulated standard of quality and production to ensure high standards and noted that self-regulation prevents fraud or misinformation and guarantees the best quality products.

The lively and stimulating Q&A sessions were also a high point of the conference and all agreed that the future of the food industry in the Asia-Pacific region was looking good.

Karen Reid, innovations manager at Brownes Dairy commented: "It was really exciting to have a food technology conference in Perth and great to see the event so well attended by both local and international industry people."

We will look forward to seeing more of our AIFST members attending, organising and giving papers at the second Asia-Pacific Food Innovation Conference in Perth in the near future.

Susanna Morley-Wong is studying for a master's degree in food science and technology at Curtin University.

OH LÀ LÀ

Concerns that one of France's grand traditions is under threat is prompting action.

Have the French fallen out of love with le baguette?

Baguette consumption in France has halved since 1970. The average Frenchman now eats half a baguette a day, a substantial drop from a century ago when the average was three baguettes per day.

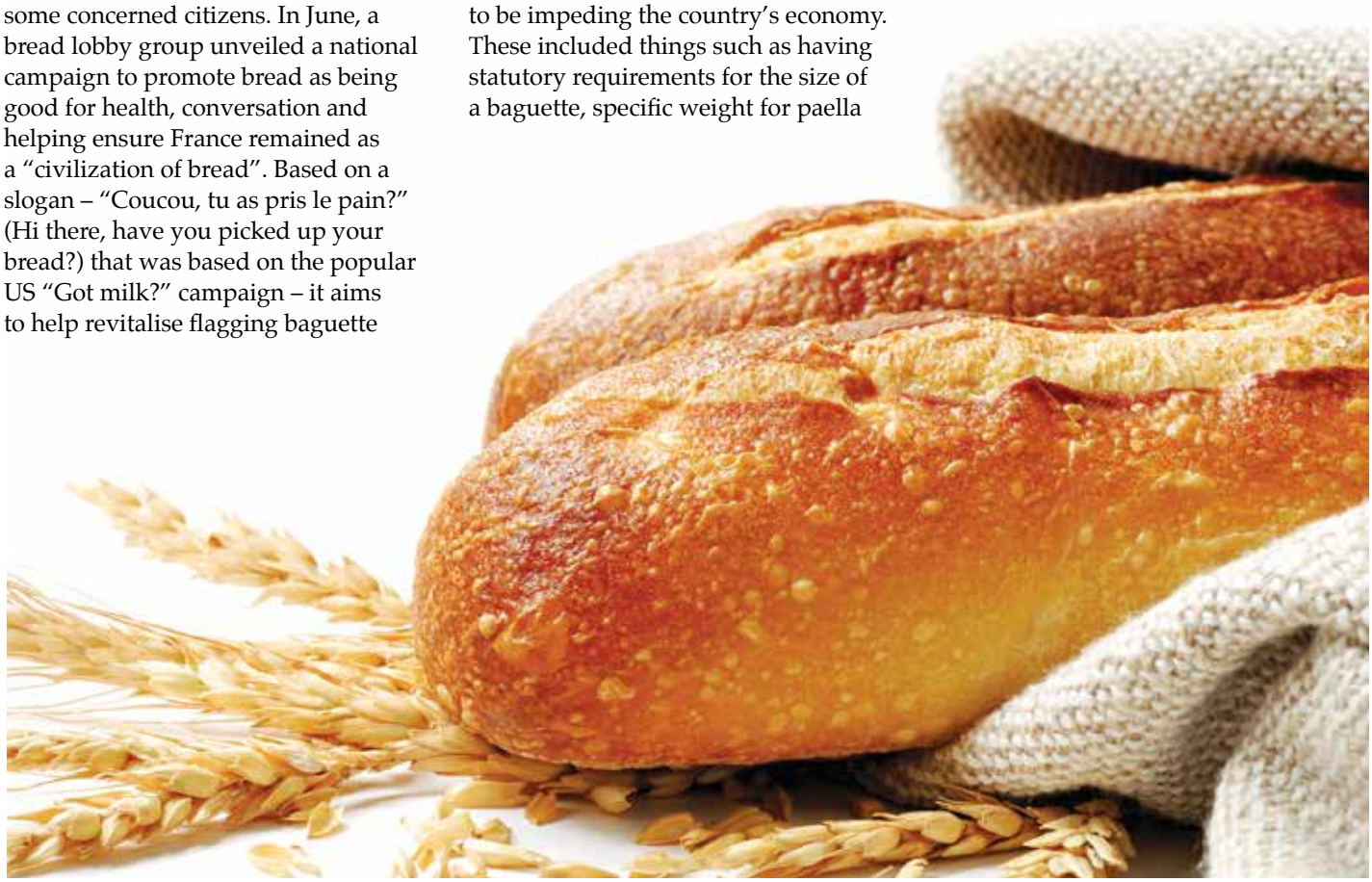
"The baguette is losing ground to rival products like cereals at breakfast, biscuits at tea time, pasta and rice at other meals," decried Valèrie Mousquès-Cami, from the *Observatoire du Pain* bakers and millers lobby group.

The decline in this ever-so-French habit has captured the attention of some concerned citizens. In June, a bread lobby group unveiled a national campaign to promote bread as being good for health, conversation and helping ensure France remained as a "civilization of bread". Based on a slogan – "Coucou, tu as pris le pain?" (Hi there, have you picked up your bread?) that was based on the popular US "Got milk?" campaign – it aims to help revitalise flagging baguette sales. The slogan has been plastered on billboards, bread bags and even scribbled in "clean" graffiti on the pavement of major French cities.

The campaign included messages that eating bread, with its "slow-burning carbohydrates" helps minimise snacking and promotes weight reduction.

Complaints that over-regulation of French products, including baguettes, was stifling the country's economic climate were raised a few months earlier. A 116-page report commissioned by the Prime Minister highlighted legions of noxious rules that were said to be impeding the country's economy. These included things such as having statutory requirements for the size of a baguette, specific weight for paella portions served in schools (180 grams for nursery school, 250 grams for primary school) and even the weight of apples (100 grams).

While it is too early to gauge any impact from the campaign, the French love affair with bread is still has a bit of life. Around 98 per cent of the population eat bread every day and buy 10 billion baguettes each year. Many still purchase their bread from one of the country's 32,000 independent boulangeries (reportedly the highest density of bakeries in the world).



AUSTRALIA & NEW ZEALAND 2013

October 16. **Joy of Baking Conference.** Australian Society of Baking conference, Mercure Sydney Airport. Visit www.aifst.asn.au for more information.

October 24. **Innovative to Survive. An Innovation Masterclass.** Melbourne, VIC. This one-day AIFST-sponsored seminar will cover all aspects of innovation in the food industry. Visit www.aifst.asn.au for more details.

October 22-24. **Food Structures, Digestion and Health International Conference.** Bayview Eden Hotel, Melbourne, Vic. Visit www.foodstructureandhealth2013.com for more details.

November 6. **Fats & Oils Biennial Conference.** Theme: The Food vs Fuel Dilemma. Organised by the Australian American Oil Chemists Society. Noahs on the Beach, Newcastle, NSW. Visit www.aocs.org for details.

December 3. **Gut feelings – what can we learn from recent research on gut microbiota?** Presented by ILSI SEAR Australia, a satellite meeting of the Nutrition Society of Australia's annual scientific meeting 2013. Brisbane Convention Center.

December 4-6. **The Nutrition Society of Australia and Nutrition Society of New Zealand 2013 Joint Annual Scientific Meeting.** Brisbane Convention and Exhibition Centre. Visit www.nsa.asn.au for details.

2014

February 25-27. **Australian Dairy Conference.** Geelong, VIC. Visit www.australiandairyconference.com.au for details.

June 22-25. **47th Annual AIFST Annual Convention.** Theme: Food, the final frontier. "Challenges and Opportunities in the 21st Century". Melbourne Exhibition and Convention Centre. Visit www.aifst.asn.au for details.

INTERNATIONAL 2013

October 28-November 1. **IDF World Dairy Summit 2013.** Yokohama, Japan. Theme: Risk management of dairy products by the integrated supply chain approach". Visit www.fi.-idf.org for details.

November 28-30. **The First International Conference of the Asia-Pacific Society for Agricultural and Food Ethics.** Theme: Food Safety and Security for the 21st Century. Chulalongkom University, Bangkok, Thailand. Visit www.apsafe2013.wordpress.com for details.

2014

February 26-28. **Global Food Safety Conference,** "One World, One Safe Food Supply". Hilton Anaheim, California. Visit www.mygfsi.com. for more information.

June 21-24. **IFT Annual Conference.** New Orleans, LA. Visit www.ift.org for more information.

August 17-21. **IUFoST 2014 World Congress "Research That Resonates,** Montreal, Canada. Visit www.iufost2014.org for details. D

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