

food australia

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DECEMBER 2015/JANUARY 2016

RECRUITING THE BEST TALENT



 **AGRICULTURAL
APPOINTMENTS**
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Also Inside

**CHOOSING THE RIGHT PATH FOR YOU
SUGAR IN THE DIET: IS THERE A SWEET SPOT?**

INDUSTRY NEEDS TO ADOPT WHOLE GRAINS CODE OF PRACTICE

ON THE COVER

Seven ways to attract top talent to regional agrifood businesses

“Quality of employees and their skills are often a business’s biggest single competitive advantage,” says Brett Price, sales director of specialist recruiting firm, Agricultural Appointments.

“Most regional and remote agrifood business owners will tell you that luring the best and brightest candidates away from cities is often a major challenge. However, there are plenty of ways of attracting top talent if employers are prepared to be creative with remuneration packages and can think outside the box.”

Mr Price is all too familiar with the task of recruiting for careers outside of urban centres.

“People who are used to the creature comforts of big cities will often balk at accepting a role in regional or remote areas,” he explains.

“In such cases, other lifestyle benefits often exist, which should be identified and relayed to the candidate. Bigger regional centres often have all the modern conveniences of big city living such as hospitals, schools and shopping precincts. Housing is also often a fraction of the cost compared to major urban centres.

“Presented with the challenge of attracting a skilled operations manager to an isolated regional area, you need to find innovative ways to provide them with a desirable lifestyle,” says Mr Price.

Here are seven strategies that can assist in attracting skilled candidates to regional or remote locations...

1. Annual leave

Offering longer annual leave will appeal to a lot of people, particularly if your business makes people take forced annual leave over certain periods of the year.

2. Flexible working arrangements

Early starts, late finishes, commitments with family and sport make most people’s lives a juggle. Helping them to fit work around their lives is one way of fostering happy, productive workers. Even allowing time off in the middle of the day for exercise or other activities helps create a happy workplace. People can make up the lost work time when it suits them.

3. Provide housing

In isolated areas, providing an on-site manager’s residence is a big drawcard. Making the housing inclusive in the remuneration package, or subsidised, is also a valuable incentive.

4. Incentives

Offering additional financial or business incentives beyond a contracted wage shows employees that you are prepared to invest in them over the long term. Also, include generous super as an inducement.



5. Think flexibly

Loosen the selection criteria and concentrate on training. Also, look for skills that are transferable.


6. Benefits for families

Include childcare/school fees/tutoring in the package. Look into employment opportunities for the spouse or partner to make the move for families easier.

7. Training

Offer tuition reimbursement and professional development benefits. Offer opportunities to attend national and international conferences.

For more ideas on what employers can do to attract top talent to their agrifood businesses, check out Agricultural Appointments publication: **The 2015 Agribusiness Salary and Trend Report** by visiting www.agri.com.au/2015-trend-report

Brett Price is co-principal and sales director of Agricultural Appointments. The company was established in 1979 and specialises in recruitment of skilled staff for the agribusiness, wine and food manufacture and retail sectors. It has offices in New South Wales, Queensland, Tasmania and Victoria and recruits nationally and overseas. 



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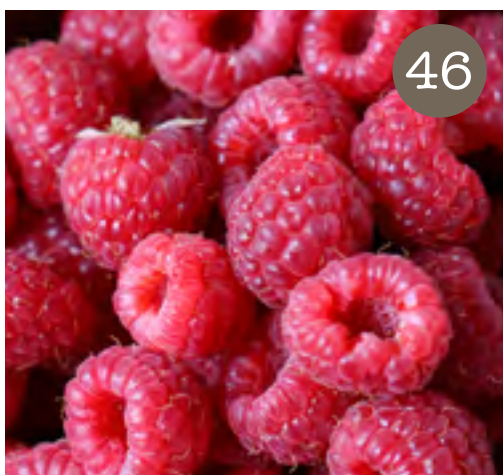
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FROM THE MANAGING EDITOR

Welcome to the December 2015/January 2016 issue of *food australia*.

In this issue, we will be taking a close look at education, training and careers; the cereals and grains industry; and the latest business trends in the food industry.

To help you fully understand what the newly announced Trans-Pacific Partnership (TPP) means for the food industry, flick through to page 20 to see a full rundown on the partnership. And on page 22, John Hine from Foodstream explains how more investment is needed for the food industry in order to prosper for the future.

On page 24, scientists from CSIRO Food and Nutrition explore the potential of sorghum as a gluten-free ingredient. And on page 28, the Grains & Legumes Nutrition Council's Chris Cashman discusses the need for the food industry to adopt the Code of Practice for Whole Grain Ingredient Content Claims as standardised practice

For the first time in this issue of *food australia*, we profile the universities and institutes across the country that offer courses, degrees and training in food science and technology. Head to page 37 to find out more.

Lastly, on page 42, we present a round-up of insights presented at ILSI SEAR Australasia's symposium.

I hope you enjoy this issue of *food australia* and I wish you, your family, friends and colleagues a happy and healthy holiday season.

Elizabeth Newport

Communications Manager – AIFST





2014-15 SEES A SURGE IN FOOD AND BEVERAGE EXPORTS

The Australian Food & Grocery Council (AFGC) has released its annual industry snapshot on Australia's food, beverage and grocery sector.

State of the Industry 2015 shows a 28 per cent surge in Australia's food and beverage exports in 2014-15, underpinning growth in the sector despite challenging economic conditions. This is the result of a significant demand of Australian food and beverage exports in Asia.

AFGC chief executive officer Gary Dawson said the report highlights the strong export growth Australia has seen.

"Food and grocery processing makes up almost one-third of Australia's manufacturing sector and it is encouraging to see growth in both industry turnover and jobs.

"An extra 3183 jobs were created last year to bring direct employment in the industry to 322,900, with 41 per cent of those in regional and rural Australia," said Mr Dawson.

The competitiveness of the Australian food and beverage markets has been improved by the falling Australian dollar and market access flowing from trade agreements, along with Australia's reputation for safe, high-quality food driving export growth.

"As the national economy transitions away from mining-led growth, the food and grocery sector is one of the key growth sectors for the future.

Despite the industry's growth in export markets across a wide range of food and beverage categories, one area of weakness for the Australian food and grocery sector is capital investment, which is falling at a time when investments are needed.

"Future growth to fully capitalise on improved market access and growing demand from middle class consumers in the emerging economies of Asia and the Middle East will require a steep change in investment in the food and grocery sector," said Mr Dawson



Food and grocery processing makes up almost one-third (30%) of Australia's manufacturing sector and is growing.



is the turnover of Australia's food and beverage, grocery and fresh produce for 2013-14, a real increase of 0.9 per cent.

In 2013-14, capital investment in the food, beverage and tobacco manufacturing sector declined almost 9 per cent from the previous year.



The total value of international trade, imports and exports, for the food and grocery sector in 2014-15, a real increase of 12 per cent from 2013-14.



of all fresh produce grown in Australia went to the national domestic market.

The percentage increase in the number of people employed in the food, beverage, grocery and fresh produce sector compared to 2013-14, totalling 322,900.



The meat and meat product manufacturing sector comprises the largest share of the total food and beverage sector turnover.



HEALTHY FOOD PARTNERSHIP TO TACKLE OBESITY AND ENCOURAGE HEALTHY EATING

A partnership of Australia's largest supermarkets, food industry bodies, preventive health groups and government will work together to tackle obesity and encourage healthy eating across Australia.

Rural Health Minister Fiona Nash will chair the new Healthy Food Partnership, comprised of the Public Health Association, the Heart Foundation, the Australian Food & Grocery Council (AFGC), Woolworths, Coles, Metcash, the Dietitians Association of Australia, AusVeg, Dairy Australia and Meat & Livestock Australia.

Minister Nash said that while the government could not force-feed healthy food to people, they could educate them to make their own healthy choices and take responsibility for what they eat.

"Australians under-consume fresh fruit and vegetables and this presents a dual opportunity – increasing consumption of fresh produce would benefit from both consumer health and Australian farmers," she said.

"The Healthy Food Partnership will work together on strategies to educate consumers on consuming fresh produce, appropriate portion sizes and to accelerate efforts to reformulate food to make it healthier.

"We will work with the food industry and preventative health organisations to create real plans to educate consumers on fresh produce and appropriate portion sizes."

AFGC chief executive officer Gary Dawson said the Federal Government is to be congratulated for successfully bringing together the food industry with the common goal of improving Australians diet.

"Australia's \$118 billion food and grocery industry transforms farm produce into food and the essentials of life for every consumer every day, and has played a lead role in reformulation, better information and choice for consumers seeking healthier options," said Mr Dawson.

The Partnership was also welcomed by the Public Health Association's chief executive officer, Michael Moore.

"With diet related disease becoming such a significant issue in Australia, we have to do all we can to counter the problems. The Healthy Food Partnership is certainly one way forward. I'm very pleased to be a part of it," he said.

Minister Nash said the Coalition Government had a proven track record on food issues.

"I know the importance of eating fresh vegetables, fruit, whole grains, dairy and met as part of a balanced diet," she said.

"The Partnership will complement the successful Health Star Rating system, which now covers 1500 products on supermarket shelves. Industry is actively making their products healthier to receive better Health Star ratings (HSR) – both Nestlé and Kellogg's have done so in the past month.

"Furthermore, independent research has found the HSR system is becoming more widely recognised and used."



Rural Health Minister, Senator Fiona Nash.

CHR. HANSEN SIGNS OFF ON DIAL DEAL

Dairy Innovation Australia Ltd (DIAL) has entered a contract to finalise the sale of its culture production unit and strain collection to Danish-based biotechnology company, Chr. Hansen.

DIAL chair Peter Boyden, said the acquisition would help benefit the Australian dairy industry.

"Securing a key international purchaser in Chr. Hansen validates our decision to separate the Cultures Production Unit from the remaining consultancy functions of DIAL.

It is important to the DIAL Board to know the supply of cultures to the Australian industry will be serviced by a global leader in the sector," said Mr Boyden.

Production will continue at the existing DIAL facility in Werribee, Victoria, for 12 months while a long-term future location is evaluated.

Kylie Evans, Chr. Hansen's country manager, said the company was committed to best-in-class coverage and service to customers.

"We are proud to be trusted by the major Australian cheese makers to supply the key ingredients.

"Now we look forward to nurturing the starter culture business within the Chr. Hansen family and becoming a stronger partner to our customers."



WORLD FIRST FOR ASUREQUALITY

New Zealand food safety assurance provider AsureQuality is the first Conformity Assessment Body (CAB) in the world to be accredited to the new FSSC22000-Q Certification module for food quality.

It has issued the accreditation to Fonterra's Te Awamutu site, which is the first dairy site in the world to gain FSSC22000-Q certification.

AsureQuality chief executive officer John McKay said that previously, food safety and food quality have been audited and assessed separately, the new certification gives companies the option of combining their food safety and quality management systems into one certification.

"We are delighted to be able to offer this integrated service to our customers, and it is especially great that the world first has happened in New Zealand," said Mr McKay.

"Our goal is to be global experts in food safety and quality and this is another step on our journey to realise this vision."

AsureQuality's technical manager for management quality, Lesley McKeown, said the number of Food Safety System Certifications (FSSCs) is rising rapidly globally.

"With increased recognition by stakeholders in the food industry, it is quickly becoming the global benchmark for food safety.

"The incorporation of ISO 9001 with its strong customer focus provides a robust framework for fully integrated Food Safety and Quality Management System. This also provides for the management of overseas market access and customer requirements, and also helps an organisation to ensure that they are able to deliver consistent quality and safe food."

Other Fonterra sites in New Zealand, including Eltham, Kapuni and Pahiatua are on track to join Te Awamutu soon in achieving the world-first gold standard FSSC2200-Q certification.

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FOOD AND DRINK TRENDS FOR THE NEW YEAR

New market research has detailed the food and beverage trends that we can expect to see in 2016, with clean eating, storytelling and the rising popularity of foods 'free from' specific ingredients, identified as the major drivers for consumers in the food and beverage industry.

Director of innovation at Innova Market Insights, Lu Ann Williams, said that one of the upcoming trends is more 'clean eating' which has inspired a back-to-basics approach in product development.

"Clean and clear labelling and 'free from' foods have all gained traction and moved to the next level during 2015.

"While other emerging trends for 2016 include the rise of part-time vegetarian ('flexitarian') consumer, interest in a return to food processing the natural or old-fashioned way, the search for permissible indulgence and the re-establishment of links to 'real' food," she said.

'Clear labelling' established itself as a key trend in 2015, with greater transparency and a focus on simpler products with fewer artificial additives.

The biggest surge in new product development has been reported in organic products, rising 3.2 per cent from 2013 to 2015, and this is expected to continue rising over the next 12 months.

AIFST's general manager of commercial services, Sarah Hyland, said that consumers are seeing artificial ingredients as public enemy number one.



"Consumer demands for natural and 'less processed' food and drink are forcing companies to remove artificial ingredients. Products that have yet to do so, will face scrutiny from consumers who are looking for natural formulations with recognisable ingredients," said Ms Hyland.

Consumers are looking for romance and relatability when it comes to food, with product choices based on the story of product origin, ingredients or inspiration.

"Confusion arises amongst consumers when telling a story about food, as similar claims are being made by legitimately handcrafted products as well as mass-produced products. Consumers and regulators will look to seek products with verified claims," said Ms Hyland.

Many consumers do not actually need products that are free from gluten, wheat and dairy, although are demanding them regardless, based on the perception that they are healthier.

FREEDOM FOODS CRACKS CHINA MARKET

Freedom Foods Group Limited has signed a memorandum of understanding (MOU), allowing the sale of its cereal and non-dairy UHT products through one of the largest business-to-consumer online retailers in China, JD.com.

Freedom Foods managing director Rory Macleod said that signing the MOU with JD Worldwide, would further cement the strong and developing relationship between the two companies.

Freedom Foods, which owns the Pactum Dairy Group, has already been selling a range of UHT dairy products through JD.com, achieving strong sales with significantly increasing demand forecast into 2016.

The new deal will allow Freedom Foods to expand its offering of cereal, snack and dairy milk products to Chinese consumers without requiring an established presence in China. The Freedom Foods flagship store is expect to go live in December 2015.

The company is currently selling its So Natural, Vitalife and Simply White UHT dairy brands through JD.com.

Following Freedom Foods' recently announced acquisition of Popina Foods, the broader strategy will also see the company and JD Worldwide combine to launch a range of products, initially focused on the Arnold's Farm oat-based clusters, So Natural oat clusters and Freedom Foods porridge.

"Our capital investment and acquisition program, including the Popina Foods acquisition, creation of the Pactum Dairy Group and the development of the UHT processing facility at Ingleburn has provided Freedom Foods with additional capability and capacity to capitalise on the rising demand in China and other Asian markets for Australia's high-quality premium food products.

"We are excited by the opportunity to partner with JD to bring Freedom Foods' trusted brands and high-quality products to the Chinese market," said Mr Macleod.



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AUSSIE INGENUITY TO DOUBLE FOOD PRODUCTION

A research team from the Queensland University of Technology (QUT) has beat out five international research teams for a plan to help double global food production by unlocking the potential of duckweed.

Team Exatio, made up of QUT post-graduate students, finished second out of six international finalists in the 2015 Global Business Challenge, a graduate business case competition to design suitable solutions for global problems.

The team devised a strategy to harvest the aquatic plant, Lemna, commonly known as duckweed, as an alternative plant-based protein solution for animal feedstock.

Led by Kerrie Muir, the team of Siona Hardy, David Martin, Luke Swetman and Nicholas Rogers, also won the Wiley Genesis Prize, providing in-kind professional services to the total value of \$100,000 towards the commercial progression of their proposed solutions.

Team member David Martin said the challenge was to design a solution to double food production by 2040.

“Every year, around the world we are losing 120 million hectares of arable land to grow animal feed stocks. So



by using non-arable land to grow new feed stocks like duckweed, we can save the arable land to grow food that people need,” he said.

“Duckweed is rich in proteins and duplicates every two to three days so it really is an incredible plant which could have significant implications for world food supply.”

The 2015 Global Business Challenge was won by a research team from the University of Cape Town, who developed a plan for efficient breeding and processing of catfish in Africa.

NEW QUALIFICATION TO UP-SKILL FOOD INDUSTRY

Risk management company SAI Global has announced a new qualification for food industry professionals to help overcome the national skills shortage in food processing.

The 10140NAT Diploma of Food Safety Quality Assurance Management will be available from 1 January 2016 and is a unique nationally recognised qualification specifically designed for professionals in operations, food safety and quality assurance roles.

SAI Global chief commercial officer Paul Butcher said the company was proud to offer the qualification for the first time in Australia.

“In 2014, it was identified that 36.6 per cent of Australian employers had jobs requiring vocational qualification.

“This new diploma will help address the need for training, helping food industry professionals develop a clear career path,” said Mr Butcher.

The qualification, which was developed in consultation with food industry representatives, will aim reduce the education gap in Food Processing Training Package qualifications for food industry quality and compliance professionals.

“This qualification will help overcome a national skills shortage that this is creating.



“With the median age of auditors being 14 years older than the average age of the workforce in Australia, this qualification will also help encourage young emerging managers into the industry,” said Mr Butcher.

Certified assessor and food safety and quality trainer Cathy Lee welcomed the qualification to help ensure Australia continues to produce quality and premium foods that are safe.

“It is an important step forward and will benefit those working in the industry as well as the food industry itself,” said Ms Lee.



CHINA FREE TRADE AGREEMENT PASSES

Australian exporters to China can expect tariffs to soon fall after Parliament passed a bill enabling a free trade agreement between the two countries.

Trade and Investment Minister Andrew Robb said the Government had worked hard to ensure agreement passed legislation, in the face of significant opposition from the Labor Party and union movement.

“Entry into force will see an immediate round of tariff cuts, followed by a second round of cuts on 1 January 2026, allowing the benefits of the agreement with China to flow quickly through to Australian exporters and consumers,” said Minister Robb.

The announcement comes after 10 years of negotiations on the deal, which will enable goods that satisfy the FTA’s rules of origin, to enter Australia at preferential rates of customs duty.

The agreement now also has support of the Labor party, with Shadow Minister for Trade and Investment Penny Wong saying that boosting Australia’s trading relationship is crucial to our nation’s economic future.

“Growing, deepening and diversifying the trade relationship with China has the capacity to deliver jobs and prosperity to future generations of Australians,” Senator Wong said.

The Government is currently working with China to pass the domestic treaty-making processes in Australia and China as soon as possible.

“Together with the Trans-Pacific Partnership Agreement, the trade agreements with Asia form a key plank of the Government’s strategy to promote jobs, growth and innovation in this critical post-mining boom period,” said Minister Robb.

“The powerful trifecta of Asian agreements account for over 62 per cent of Australia export market and provide Australian businesses with access to more than 1.5 billion people, opening up endless opportunities across goods, services and investment.”



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Felicity White

Agricultural Appointments expands their team

Recruitment and industry specialists, Agricultural Appointments, have added three new members to their executive search and selection team.

Felicity White joins the team in Queensland after 22 years of experience across the agriculture and agribusiness industry. She has held a number of roles in sales, marketing and business development.

Dan Duggan has spent over a decade working in and around the agricultural commodities market. He joins the team in Victoria, focusing on search and selection for talent in the agricultural commodities sector.

Troy Cook has been appointed to the Tasmania office, bringing a breadth of experience in agriculture and food to Agricultural Appointments clients. He is vice-president of the Australia China Business Council (ACBC) Tasmanian branch, as well as director of the ACBC.



Dan Duggan



Troy Cook

ALFA welcomes new president

The Australian beef industry has welcomed its first female peak council head, announcing Tess Herbert as president of the Australian Lot Feeders' Association (ALFA).

Ms Herbert, who operates two feedlots with her husband Andrew, joined the ALFA board filling a casual vacancy in 2009 and was elected at the following annual general meeting (AGM).

Elected at ALFA's AGM in Toowoomba, Queensland, as president, Ms Herbert said her priorities would be on animal health and welfare, as well as promoting the importance of feedlots in the supply chain.

Ms Herbert steps into the role succeeding former president Don Mackay, who will continue to serve on the ALFA board as immediate past president.



Brent Finlay

NFF re-elects president, board

Queensland farmer Brent Finlay has been re-elected unopposed as president of the National Farmers' Federation, making it his third term at the helm of the organisation.

Mr Finlay was re-elected at the industry's recent Members' Council meeting and AGM,

where farmer and grazier Fiona Simson was also returned to her role as vice-president.

All five directors from the previous board were also re-appointed – ricegrower Les Gordon; mixed farmer and grazier Peter Tuohy; beef producer Grant Maudsley; mixed farmer and grazier David Jochinke and beef producer Mark Horan. ☺

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FROM THE CEO



What a year 2015 has been. This year has seen significant change in our organisation, which will now set us up for bigger and better things in 2016.

Planning is already well-advanced for the 49th Annual AIFST Convention being held 27-28 June 2016 at the Brisbane Convention & Exhibition Centre, where we will co-locate with FoodTech.

We've also begun organising the 2016 Continuing Professional Development (CPD) events, which

will provide greater information sharing and networking opportunities for members.

As well as our industry events, AIFST's focus for the new year will be investing in technology upgrades to allow the Institute to engage more effectively with members in a more targeted and personal way.

AIFST also welcomes Sarah Hyland to the team in the newly created General Manager of Commercial Services role. Sarah brings with her a wealth of commercial experience and will give AIFST the best skills to provide enhanced and more intuitive products and services in 2016.

I would like to thank all the members who have volunteered their time and expertise to the Institute throughout 2015. It is through this passionate group of professionals that we can ensure AIFST remains relevant to our members.

Lastly, I remind you all that it is membership renewal time, and, if you haven't already, I urge you to complete your application. The AIFST board has kept the 2016 membership fees the same as the 2015 rate, as we focus on the new strategic plan in 2016.

I wish you and your families a safe and healthy finish to 2015 and start to 2016. I look forward to working with you all in the new year.

Georgie Aley



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ASIA AUSTRALIA FOOD INNOVATIONS

Greener food processing methods, 'digital food' and foods specifically designed for the Asian market are just some of the megatrends to be unveiled at AIFST's 2016 Asia Australia Food Innovations Conference.

Research director for CSIRO Food and Nutrition, Dr Chris Downs, is set to present CSIRO Futures Group's seven major megatrends for 2016 and what they mean for the future of Australia's food industry at the two-day conference held in Perth from 17-18 March 2016.

"The CSIRO Futures Group's megatrends show where the market opportunities are for our food producers, and predict a shift from a primarily commodity-based industry to focusing on a value-adding industry," Dr Downs said.

"The pace of innovation must underpin investment in our industry, and it's important our food producers are aware of and understand the latest scientific trends and technology, and how they can potentially grow their businesses.

"The concept of 'adding value' will drive the Australian industry forward as a producer of healthy, sustainably produced foods, expertly targeted to different consumer markets."

Within the driving megatrends, Dr Downs is set to discuss the science around high-pressure processing, which stabilises raw food materials

and enables them to be safely sent long distances, as well as innovative practices geared towards the Asian market such as purpose-designing food products that closely target Asian lifestyle and taste preferences.

Asia Australia Food Innovations Conference chair Justin Whitely said Australian food producers stand to gain from the heightened demand for high-quality food products in Asia, but without many chances to meaningfully network within the region, opportunities are being lost.

He said the AIFST's second Asia Australia Food Innovations Conference will be the best networking opportunity for Australian and Asian businesses looking to connect and be ahead of the game when it comes to investing in and using innovative technology.

"Australia is geographically poised as the logical source of clean, green food as the delicatessen for Asia," he said.

"I am looking forward to networking with industry leaders in the food and agribusiness sector from both Asia and Australia, assisting Australian food industry players on how to capitalise on insights and emerging trends in Asia, and better understand how scientific developments can help grow our industry," he said.

Dr Downs is just one of several world-class experts who will feature in Perth, including Associate Professor



Justin Whitely, Asia Australia Food Innovations Conference chair.

Gary Dykes, deputy head of school of public health at Curtin University, who will discuss innovative methods for ensuring agrifood security; Najib Lawand, general manager of market development at Food Innovation Australia Ltd who will discuss Asian market insights and export readiness; and Bonnie Shek, director of the Hong Kong Trade Development Council who will discuss the Hong Kong food and catering hub for Asia.

Registrations are now open and food producers across Australia are encouraged to attend. To register and take advantage of early bird pricing, please visit www.aafic.net.

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AIFST 2016 AWARDS

Nominations are now open for the 2016 AIFST Awards which will be presented at the 2016 Annual AIFST Convention.

Food Industry Innovation Award

This award recognises a significant new development in a process, product ingredient, equipment or packaging in food safety or logistics, which has achieved successful commercial application in the Australian food industry over the past five years.

Keith Farrer Award of Merit

This is awarded for achievements in food science and technology in the fields of research, industry and education, and helps further the aims and objectives of the Institute.

President's Award

This award recognises, acknowledges and acclaims outstanding contributions to the Institute by an individual or organisation.

Sensory Solutions Tony Williams Sensory Award

For the first time, this award recognises an undergraduate AIFST student member studying an aspect of Sensory who demonstrates academic achievement, interest, enthusiasm and integrity in Sensory Research. The AIFST Sensory Solutions Tony Williams Sensory Award is named in honour of Anthony Williams, one of the pioneers of Sensory Research in the United Kingdom.

Jack Kefford Award

This award recognises an exemplary food, science and technology paper published in any peer-reviewed journal (print or electronic) by an AIFST member in the previous year.

Malcolm Bird Commemorative Award

This award recognises members under the age of 30 who demonstrate academic achievement, leadership and integrity in their profession. Selection is based on a 1000-word technical abstract and oral presentation on an aspect of food science, which is given at the Annual AIFST Convention.

Student Product Development Competition

This competition provides students with an opportunity to develop and present an innovative new product. The 2016 award is open to undergraduate and for the first time post-graduate AIFST members. The 2016 competition will celebrate the United Nations International Year of Pulses and focus the product development brief on pulse based foods.

Bruce Chandler Book Prize

The late Bruce Chandler bequeathed funds to establish a prize for a book that has been published in the past five years and makes a great contribution to food science and technology.

Award nominations close – 11 March 2016

Detailed information, including conditions and the nomination process for all awards, is available on the AIFST website.

VALES

Renowned microbiologist **Graham Fleet** sadly passed away last October, aged 69, after a decorated career within the international food science industry.



Graham Fleet

As a member of AIFST for nearly four decades, Graham will be remembered for his passion, dedication and genuinely outstanding achievements in microbiology and food science.

With a keen interest in science from an early age, Graham graduated from the University of Queensland in 1967 with a Bachelor of Science (Honours) majoring in microbiology and biochemistry, which he followed up with a Masters of Science in microbiology.

From there, Graham was awarded the Fullbright Scholarship which took him overseas to undertake a PhD at the University of California, Davis, before moving to the Heriot-Watt University in Edinburgh, Scotland, to complete his post-doctoral studies in yeast research.

Graham returned to Australia in 1975 where he took up a position as lecturer in food microbiology at the Department of Food Science and Technology at the University of New South Wales (UNSW). He remained there for more than three decades, became a Professor in 1996, oversaw the PhD studies of countless students and led groundbreaking research around the growth of micro-organisms in foods and beverages and their impacts on product quality and safety and production efficiency.

In recognition of his achievements, a new yeast species was named in his honour in 2004, AIFST awarded him the Keith Farrer Award of Merit in 2007, and he was appointed an Emeritus Professor at UNSW in 2011.

In order to continue Graham's work in the microbiology field, his family have set up the Graham Fleet Memorial Fund through UNSW to advance education and research in food sciences and microbiology. Please donate by visiting www.donate.unsw.edu.au and note the recipient as the Graham Fleet Memorial Fund.

The Australian food industry is also mourning the passing of three other industry leaders in the past few months: AIFST Life Fellow **Geoffrey Greethead** following his celebrated career at CSIRO and Unilever, **Bob Whan AM** who was influential in establishing the NSW Food Authority, and chair of the AIFST Tasmania branch, **Bryan Brassington**. For full vales, please visit aifst.asn.au.

The AIFST extends its condolences to the families and friends of each of these industry leaders.



INNOVATE... OR EVAPORATE!

Innovation in the food industry can be described as stagnant although it is critical that businesses foster innovation for the industry to be able to grow.

Words by *Bronwyn Graham*

Crowd funding, accelerating innovation, intellectual property and the importance of collaboration were some of the key takings from AIFST's 4th Innovation Masterclass held in Melbourne last October.

The Innovate or Evaporate Innovation Masterclass was part of the AIFST's Continuing Professional Development (CPD) Program.

This year, a new program of speakers ensured delegates received the latest and most up-to-date information on innovating in the food industry.

Food industry expert and chair of the organising committee for the Innovation Masterclass, Russel Rankin, said that innovation in the Australian food industry is stagnated, and it is crucial businesses make investment in innovation a priority in order to thrive and survive.

Delegates heard from an impressive bill of food industry professionals, who shared their insights on how the food industry can foster the often daunting notion of 'innovation' and the steps to developing a culture of innovation in the workplace.

Mirjana Prica of Food Innovation Australia Limited (FIAL) opened the Masterclass, providing an overview of the vision for the Federal Government's Food and Agribusiness Growth Centre.

The need for innovation in the food industry was another key area of interest, with Martin Cole, director of CSIRO's Food and Nutrition Flagship, exploring the challenges and opportunities that businesses face when tackling the 'I' word.

Mitch McGuire from Enterprise and



Professor Tristan Perez, QUT.

Angeline Achariya from Mondelez International Food Innovation Centre tackled the big question – "How can I innovate?" – by exploring some of the latest initiatives available to businesses to grow and innovate.

Ms Achariya stressed the importance of collaboration, commitment, insights into Asian markets and educating the future leaders of the food industry to be innovators in order for the food industry to continue to grow.

As high costs are often a hindering factor into innovation, another key area of the Masterclass was funding opportunities that are available.

Speakers from the Coles Nurture Fund, Pozible and Horticulture Innovation Australia Ltd (HIAL) gave an overview of what they are doing to promote innovation industry-wide.

Similar to the previous three Masterclasses, intellectual property was a popular topic, and an area many



Dr Ian Maxwell, director, Accordia IP.

in the industry were interested in learning more about.

The Masterclass wrapped up with a number of presenters sharing their case studies and real-life examples showcasing how the food industry is already harnessing innovation.

Overall, feedback from the Masterclass was positive, with attendees finding the presentations very informative.

With innovation at the forefront of the Turnbull Government, attendees were excited about the opportunities of innovation and what this will mean for the industry.

Not all presenters have been acknowledged in this article, however AIFST would like to thank all who presented at the 4th Innovation Masterclass.

For more information, please contact CPD co-ordinator Bronwyn Graham at bronwyn.graham@aifst.com.au



PREVENTIVE HEALTH INITIATIVES – ONE STEP FORWARD, ONE STEP BACK

Two new announcements highlight the contrast in perceptions of how the food industry can assist in the preventive health policy space.

Words by *Geoffrey Annison*

November 2015 witnessed two major announcements in the preventive health policy space. The first reported the convening of a new Commonwealth Government-led Healthy Food Partnership. Chaired by Minister for Rural Health Fiona Nash, the Healthy Food Partnership includes representatives from industry (primary industry, manufacturers, quick service restaurants and retailers) and the public health sector.

The Partnership met for the first time on 13 November 2015 and while the date may not have augured well for the future of the Partnership, the meeting was very positive.

The Partnership agreed that future collaborative projects should build on the work already underway in the preventive health space, with a specific focus on increasing the consumption of core foods, particularly fruit and vegetables, and continuing support for food companies in product reformulation.

Reformulation to reduce levels of risk-associated nutrients has been an industry collective action priority for some time, particularly in the area of sodium reduction. Indeed, there is now some anecdotal evidence that introduction of the Health Star Rating (HSR) front of pack-labelling scheme in June 2014 has led to further reformulation of some products resulting in higher scores under the HSR scheme (i.e. more stars).

Portion size, or serve size, is also to be a focus under the Health Food Partnership, and again the food

industry will have a major role in this work. From a technical point of view, it is an area of considerable complexity for some product categories. This complexity has led to serve size labelling being the subject of some criticism of the food industry. Public health and consumer representatives have the view that lack of uniformity in serve sizes within some categories is confusing to consumers.

For the Australian Food & Grocery (AFGC) there are three important facets to the serve size debate. The first is how much a serve size should be from a nutrition point of view – i.e. how much the product should contribute to the diet of a healthy Australian adult in one serve.

Serve sizes recommendations have been developed as part of consumer education that supports the Australian Dietary Guidelines, but agreeing on a serve size for some discretionary foods may be quite difficult, for instance a Hawaiian pizza.

Secondly, there is the issue of serve size, or portion, standardisation. This is about standardising the amount across the industry and within product categories for labelling purposes. While it is relatively easy for some categories, particularly where the density (weight/ volume) is relatively constant, when it varies substantially, it becomes more problematic.

Then, there is the issue of portion control, which is likely to be the most effective method in assisting consumers to manage their diet and hopefully contribute to their overall good health.

There are already many excellent examples of products being presented in convenient, modest portions to assist healthy diet construction.

The second recent major initiative in preventive health has been the new Australian National Diabetes Strategy, which was released in the same week as the Healthy Food Partnership. The Strategy is the Government's response to the continuing rise in the number of people with diabetes in Australia.

The Strategy encompasses preventive actions and ways to better manage the disease. The preventive actions outlined are directly relevant to the food industry as diet is considered one of the central modifiable lifestyle risk factors, along with physical activity (or rather lack thereof) for diabetes, particularly type 2 diabetes.

Promotion of healthy eating through support for initiatives such as the HSR are again flagged, along with supporting efforts to reduce the exposure of children and adults to marketing of energy-dense, nutrient-poor foods and beverages, which are also termed discretionary food and beverage items.

Of course, the impact of advertising on the dietary choices of children, and ultimately their health outcomes, has been a concern among preventive health professionals for a number of years. For almost as many years, the Australian food industry has moderated its advertising, recognising this concern. The AFGC's Responsible Children's Marketing Initiative, along with the very similar Quick Service Restaurant



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- Assoc Prof. Gary Dyke, Curtin University
- Najib Lawand, Food Innovation Australia Ltd
- Bonnie Shek, Hong Kong Trade Development Council

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Initiative for Responsible Advertising and Marketing to Children, which was introduced in January 2009, have been very effective self-regulatory marketing codes. Between them, they have greatly reduced the advertising of discretionary foods directed primarily at children.

The AFGC participated in the community wide consultation during the development of the National Diabetes Strategy. The AFGC submission highlighted the many contributions the food industry had made to the efforts to help Australians improve their nutritional health, from support of front-of-pack nutrition labelling through to reformulation efforts.

The AFGC also canvassed the idea of developing an industry-wide food assessment program designed to identify foods, which by virtue of their nutrient profile might assist people with diabetes to modify their diet; an idea which gained no traction in the Strategy.

It is disappointing that the Strategy does not include opportunities to work in partnership with industry, but rather slips back into the tired paradigm of attempting to limit the consumption of discretionary food products by restricting the food choices (either through availability of affordability) of all Australians, not just those with diabetes.

Of course, those responsible for development of the Strategy will argue that many Australians are pre-diabetic and they need assistance in lowering their risk of developing the disease. The AFGC does not dispute this, but the contrast in approaches between the Strategy and the Healthy Food Partnership described at the top of this article is stark. The former sees no role for the food industry, the latter sees the food industry as a central player in improving the nutritional status and health of Australians.

The AFGC will continue to promote the role of the food industry as a partner in preventive health and hopefully future steps by all participants in the preventive health arena will be forward. [➤](#)

Dr Geoffrey Annison, PhD, is deputy chief executive and director of health nutrition and scientific affairs at the Australian Food & Grocery Council.

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THE TPP & YOU

The Trans-Pacific Partnership is the most significant multi-lateral trade agreement in 20 years. food australia investigates what it really means for our food and agriculture industries.

It's taken five years of negotiations between 12 of the most influential economies on the Pacific rim, and now the long-awaited Trans-Pacific Partnership (TPP) is here.

The 12 negotiating nations, which account for 40 per cent of the world's economy, finally agreed on the TPP's terms in October, with the full details of the agreement unveiled in November. Now the terms are with each country's parliament to be ratified, and assuming all goes to plan, it could still be months before the TPP actually comes into force.

But what exactly does the TPP involve? Who are the winners and losers? And what does it mean for Australia's existing Free Trade Agreements (FTAs)?

From an Australian perspective, the TPP increases our access into overseas markets. According to Tim Harcourt, the former chief economist for Austrade, the TPP's biggest selling point is its significant tariff reductions. It is expected the TPP will eliminate 98 per cent of tariffs in the region, and remove approximately \$9 billion of import taxes on Australian trade.

In his annual DHL Export Barometer, 46 per cent of Australian exporters were positive about the expected benefits of the TPP – up from 37 per cent last year, and 26 per cent in 2013. Mr Harcourt said this spells good news for Australian food producers who both export and import.

"On the tariff side, I think it's probably good. I mean 98 per cent of tariffs imposed on the region will go and for the food and beverage people, it's probably a big win – some in services, some in resources," he said.

"When you think of exporters overall, 80 per cent of them also import, so any reductions that help exporters also help importers as well.

The winners

The food and agriculture industry has emerged as a major beneficiary of the TPP, along with the services and resources industries. In fact, most of the arguments against the TPP have nothing to do with agriculture, but rather centre around intellectual property and the US-led extension of patents on biologic pharmaceuticals.

For the food industry, the agreement is a major win and has been welcomed by the industry's leading bodies including the Australian Food & Grocery Council (AFGC) and the National Farmers' Federation (NFF).

Estimated to add up to \$3.7 billion to the Australian industry, according to HSBC Bank Australia, the NFF believes it will deliver Australian producers greater long-term benefits than can be achieved by a bilateral trade agreement, particularly with those countries with whom Australia does not have an FTA (Canada, Mexico and Peru).

Meat

Beef is Australia's largest global agriculture export, and 55 per cent of those exports currently go to TPP countries.

Building on the Japan-Australia Economic Partnership Agreement that came into force at the start of 2015, there will be significant tariff reductions on all meat headed to Japan. This includes tariffs on beef to drop to nine per cent within 15 years, and a complete elimination of

tariffs on offal and processed meat products within 15 years.

Outside of Japan, Australian beef producers will also gain greater access to Canada, Peru and Mexico with a complete elimination of beef tariffs in each of those countries within 10 years.

Australian lamb and pork exporters will also benefit. There will be a complete elimination of tariffs on sheep meat to all TPP countries immediately, except for Mexico, and significant reductions in Japanese tariffs on pork, as well as a complete elimination of pork tariffs with Malaysia, New Zealand and Mexico.

Cereals and grains

The total Australian exports of cereals and grains was valued at approximately \$8.2 billion in 2014, 18 per cent of which was exported to TPP countries.

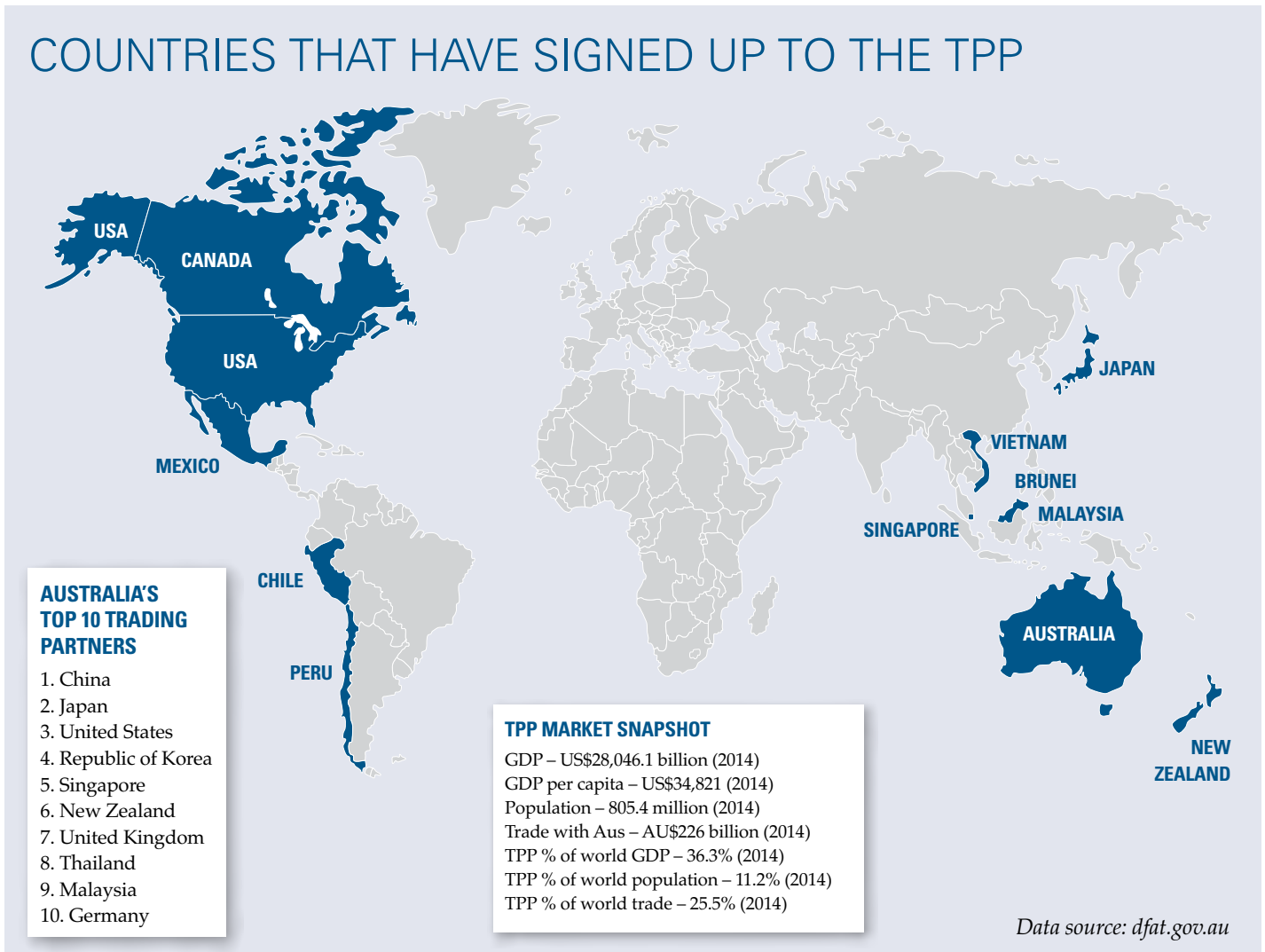
Under the TPP, there is greater market access to Japan thanks to a 45 per cent reduction on the mark-up on wheat and barley as well as new quota volumes for wheat, barley and malt, and complete tariff elimination in Canada, Mexico and Peru.

Dairy

The dairy sector will also enjoy increased market access to Japan thanks to an elimination of tariffs on some cheese products and new quota allocations on others, as well as other dairy products including butter, milk powders and ice-cream.

The USA, which accounts for \$20 million in Australian dairy exports, will also relax its in-quota tariffs, and new quotas will be developed in Canada and Mexico.

COUNTRIES THAT HAVE SIGNED UP TO THE TPP



Rice

Significantly, Japan will increase rice imports for the first time in 20 years. This means Australia's rice producers will have greater access to the Japanese market with our quota increased to 6000 tonnes upon the start of the TPP, as well as a reduction in tariffs on rice preparation products, and an amendment to the World Trade Organization quota of an extra 60,000 tonnes of medium grain rice for processing.

Sugar

A modest increase of 65,000 tonnes of export into the giant US sugar market has been widely criticised as not going far enough. But regardless of the politics, it remains the largest access granted by the US to a sugar exporting country in more than 20 years. The TPP also includes tariff reductions in Japan, Canada, Mexico, Vietnam and Malaysia.

Wine

Forty-five per cent of Australia's total wine exports are to TPP countries, valued at \$837 million. The wine industry has welcomed the tariff eliminations the TPP will bring, saying it will allow Australian wine to compete on a level playing field. The biggest change will be in exports to Canada, which were valued at \$174 million in 2014. Tariffs will be eliminated when the TPP comes into force, while tariffs will gradually be lifted in Malaysia, Vietnam, Mexico and Peru.

Horticulture

The biggest changes to the horticulture industry apply to orange exports to Japan. Building on the Japan-Australia Economic Partnership Agreement, Japan will extend the period by which oranges face lower 'out of season' tariffs to eight months, and the higher 'in season' tax will be eliminated completely within seven years.

Japan will also eliminate tariffs on fruit juices within 10 years.

There are significant growth opportunities for Australian horticulture to access Canadian, Peruvian and Mexican markets with tariff elimination immediately in Canada and Peru, and within 15 years in Mexico.

What does this mean for the Australia-China FTA?

Well, nothing. The Australia-China FTA has been signed, and will come into effect imminently. For Australian food producers, the two agreements are mutually exclusive and mean a reduction in tariffs to not only the 12 TPP nations, but China as well – Australia's biggest agriculture export market.

While some economists, including Harcourt, predict China will eventually join the TPP, for now, the Australian agriculture industry must brace for an influx of Chinese investment. ☐



INVESTMENT IN FOOD MANUFACTURING NEEDED

The food industry has eagerly awaited the release of two Australian Government White Papers, but the future of Australia's food manufacturing sector remains unclear.

Words by John Hine

There has been much debate on the future of Australia's food manufacturing sector and the role it can play in a growing export market.

With international players also keen to seize the export opportunities presented by Asia, Australia must adapt quickly or fall behind. With this in mind, the release of two Australian Government White Papers on Developing Northern Australia, and Agricultural Competitiveness, which relate to our food industry, were both welcomed.

However, disappointingly, neither paper said anything much about food manufacturing.

Agribusiness projects announced or being planned for northern Australia are large but tend to have little to do with food manufacturing, other than beef abattoirs, such as that recently built near Darwin by the Australian Agriculture Company. Other large agribusiness projects, which do not include food manufacturing, are:

- The \$200-million Stanbroke Three Rivers project, south of Normanton, aimed at cropping and cotton
- The \$1-billion project of the Shanghai Zhongfu group in the Ord River, to grow chia and sorghum
- The \$1.45-billion Sea Dragon project for 10 000 ha of prawn ponds on the WA/NT border.

Why food manufacturing?

A study done many years ago by the Australian Government suggested food processing done in Australia could actually reduce value if we were selling into a market based on cost. Our relatively high cost base told against us.

Furthermore, the Australian Advanced Manufacturing Council seems to not see food manufacturing as 'advanced manufacturing' despite the high level of technology and value adding used by many food manufacturers.

The Queensland Government sees a major opportunity in bio-manufacturing and released a discussion paper on a 'roadmap' for such an industry in November. Bio-manufacturing will use inputs from sorghum, the sugar cane industry and other sources of woody material, but again, this is not food manufacturing in the traditional sense.

However, there is now a large niche market in China for Australian food products based on quality and our track record of food safety. This is especially the case with baby food and vitamins. The market is so strong that local baby food company Bellamy's now has its own online site aimed at China; vitamin company Blackmores is now the highest value share listed on the ASX, based significantly on its booming vitamin sales overseas, especially to China; and the parcels trade with China is so strong, Australia Post has changed its systems in order to send parcels to China more easily.

The recent *State of the Industry* report from the Australian Food & Grocery Council (AFGC) noted that there has been a spectacular surge in food and beverage exports, up 28 per cent on last year and a near doubling of the trade surplus for food and beverages.

This has reversed the position of four years ago, which did not look bright.

However, the AFGC Report states

investment still needs to rise to assist in capturing new opportunities. Opportunity is there for the food manufacturing sector.

Paine & Partners, a US-based equity firm, recently sold a major share in the Australian fruit and vegetable company, Costa. Paine has some \$1 billion invested in agribusiness, although aims at high value areas of the supply chain closest to the farm or seas, rather than in processing.

But even if agribusiness investment is more in farming and aquaculture such as that of Paine & Partners, these companies will need significant post-harvest technology to get their products to China in good shape. Presumably, this will particularly apply to prawns from the planned Sea Dragon operation on the WA/NT border.

Australian success in China

A number of established Australian food processing companies are also going well, including Tassal salmon, Capilano honey, Bega cheese, Select Harvest nuts and health food, and Murray Goulburn dairy. These all had market strategies that included exporting high value products to China.

Some companies have formed close links with Chinese groups, to gain capital and access to markets, such as Bindaree Beef, which has sold 45 per cent of equity to China's fourth-largest pork processor, the Shandong Delisi Food Co, for \$140 million.

It may be that formal networks or cooperatives of Australian food manufacturers could be formed to assist smaller companies enter the large, diverse and complex Chinese market.

Commentators on the China Free Trade Agreement stress the significance of the opening of trade in services between Australia and China. Australia has a flourishing cook-chill sector working in the aged and healthcare sectors, as seen in the Australian Cook-Chill Council.

This could mean developing a food product here for manufacture in China, selling Australian food technology and manufacturing systems into the aged care and healthcare markets in China, where Australian companies are investing, or air freighting high-quality food direct to these aged care and healthcare facilities.

Using Australian technology overseas has been a feature of the fruit and vegetable company, Costa. It has developed new 'glasshouse' technology for growing blueberries and has invested in growing facilities in Morocco for sales to Europe, and in Thailand for sales to China.

Certainly, the big players are moving on opportunities in China.

International competition

There is a growing band of very large investors moving on the demand for quality food by the Chinese middle class. These investors are moving quickly and often include those from outside the traditional agribusiness sector.

US agribusiness company Archer Daniels Midland (ADM) has increased its ownership share of the major Asian agribusiness Wilmar, by buying 22 per cent of its shares. The stated aim was to give ADM more exposure to growing Asian food markets.

There is also a major move by pension funds and other investment funds into agribusiness. The publication Pensions and Investments (7 September) said that this year, there were 33 private equity-focused agriculture funds seeking investment of US\$8.5 billion. Investors include a number of US pension funds.

The US teachers superannuation fund TIAA-CREF has some US\$5 billion invested in farmland internationally. Their investment vehicle, Westchester, has offices in New South Wales, Victoria and Western Australia, and the fund has announced that it sees a major opportunity in Australia as older farmers leave the industry with no succession plans.

The large US-based companies, Kraft and Heinz, have recently been merged following a takeover by Warren Buffet's Berkshire Hathaway and the Brazilian company 3G. Presumably significant changes are planned.

The message here is that there are significant opportunities for high-value food products into China, aimed at the significant growing middle class, based on our reputation for safe, quality food.

In the face of such competition, all aspects of Australian agribusiness need to move quickly to capture its share of this large market. 📍

John Hine is an associate of FoodStream, foodstream.com.au, a professional food science and engineering company for the food manufacturing industry. FoodStream is the technical hub of Innovation Optimisers, innovationoptimisers.com, which provides Australia's first Outsourced Innovation Team.



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SORGHUM – NEW GLUTEN-FREE INGREDIENT AND APPLICATIONS

Sorghum is attracting commercial interest for its potential use in food applications. Research from CSIRO looks at the potential of increasing protein digestibility of sorghum.

Words by *Thu McCann, Debra Krause and Peerasak Sanguansri*

Healthy grain and potential for gluten-free products

Sorghum is a drought-resistant and low-input cereal crop and major staple food in Africa, Asia and Latin America. It is naturally high in fibre and iron, rich in antioxidants and, as it contains a high level of non-gluten protein, is suitable for coeliac sufferers.¹ For these reasons, sorghum is known as a ‘healthy’ grain. Further, sorghum’s high level of antioxidants, cholesterol-lowering waxes and phenolic content could make it a cereal grain for healthy ageing.²

Flour made from sorghum has higher levels of protein and iron compared to corn and rice flours, which are commonly used as a main ingredient in gluten-free foods (Table 1). Sorghum flour has similar amounts of fibre to corn flour. It has a neutral flavour and does not add an unfamiliar or a distinctive taste to food products. Overall, sorghum is therefore attracting commercial interest for use in potential new food product applications.³ This is especially true in the gluten-free market segment to replace corn, rice and gluten-free wheat flour, since sorghum is slightly cheaper than corn and wheat flour and only half the price of rice flour in commodity markets.

Limitations for food applications

Although sorghum and sorghum flour have a relatively high nutritional value, its low-protein digestibility has been a drawback for its use as food ingredient. The main protein in sorghum is α -kafirins, presenting as monomers encapsulated within a disulphide bond polymer network of β - and γ -kafirins. When sorghum undergoes cooking in a high-moisture environment,

Table 1. Nutrient Content of Cereal Grains (USDA, 2014)

Component (per 100g)	Corn	Rice (white)	Wheat	Sorghum
Protein (g)	9.4	7.1	12.6	11.3
Fat (g)	4.74	0.66	1.54	3.3
Carbohydrate (g)	74	80	71	75
Fibre (g)	7.3	1.3	12.2	6.3
Calcium (mg)	7	28	29	28
Iron (mg)	2.71	0.8	3.19	4.4
Thiamin (B1) (mg)	0.39	0.07	0.3	0.24
Riboflavin (B2) (mg)	0.2	0.05	0.12	0.14
Niacin (B3) (mg)	3.63	1.6	5.46	2.93

the interaction of kafirins with other proteins, starch granules and other components such as polyphenolics, leads to a reduced digestibility of sorghum protein.^{4,5} Sorghum proteins are also unable to form the composite viscoelastic doughs required for bread making and pasta production. The low protein digestibility and lack of protein functionality limits the application of sorghum in food. It is, therefore, essential to identify processes to improve the digestibility and functionality of sorghum protein to enable its uptake in food applications, especially in the gluten-free food product range.

Sorghum-based commercial food products

Sorghum is commonly used worldwide as an ingredient for porridge, pancakes, flat bread, couscous, as well as alcoholic and non-alcoholic beverages. Due to its low protein digestibility, there are few commercial sorghum-based food products on the market. Commercially, sorghum is mostly used as meal or for beer, malt and flavoured drinks such as Maltina (malt drink), red sorghum

drink with guava flavour and Morvite, an instant drink. Sorghum is not often present in breakfast cereals either alone, or in combination with other grains.

In Australia, the majority of sorghum is grown in New South Wales and Queensland, with a total production value of 1.8 million tonnes in 2015.⁶ Sorghum in Australia is mainly used as animal feed or for bio-fuel/ alcohol production. Recent application in food has included the incorporation of sorghum as a main ingredient for gluten-free Weet-Bix by Sanitarium.⁷

Low-moisture extrusion process

The low-protein digestibility and lack of viscoelastic properties are two hurdles to extending the use of sorghum in food. Modifying the structure of protein and starch in sorghum is a potential solution to increasing the protein availability and viscoelastic properties of the flour. For these reasons, a number of methods have been developed to modify the protein structure through biochemical/chemical, enzymatic and thermo-mechanical approaches.⁸ Proteolysis, the breakdown of proteins into smaller polypeptides or



amino acids, is the primary mechanism for improving protein digestibility in fermentation or enzymatic treatment.

Deamidation is a chemical reaction that converts the amide groups of asparagine and glutamine into carboxyl groups, making the protein more susceptible to degradation. This could increase sorghum protein digestibility after sorghum is thermo-treated to open the structure of protein.⁸

Extrusion cooking is an economical and versatile thermo-mechanical food processing technology. It combines multiple unit operations, such as mixing, cooking, shearing and cutting into a single process for production of a wide range of food ingredients and products. This process can also transform food components to deliver enhanced functionality of food ingredients. For example, extrusion can improve product digestibility through starch degradation, protein denaturation, enzyme inactivation and modification of lipid and anti-nutritional factors.⁹ The study of low-moisture extrusion on sorghum flour showed that extrusion's high mechanical energy would open the protein body structure,

thereby increasing protein digestibility.¹⁰ Based on these findings, the CSIRO extrusion team has used its Cleextral EV32 extruder to produce an expanded snack using sorghum flour supplied by Maralong Milling in Queensland, as the main ingredient. The aim of this work was to explore the opportunity of replacing corn grit with sorghum flour in cereal extrusion in order to improve the digestibility of sorghum protein.

Expanded sorghum snack

Sorghum flour, corn grit and a mixture of corn and sorghum (50:50) was extruded at different barrel moisture contents (23, 21 and 19 per cents). This was achieved by mixing the flour with various amounts of water within the screw barrel. Figure 1 (next page) shows that more expansion was obtained at low barrel moisture content for all flour samples. This is because low-moisture extrusion provides higher in-barrel viscosity, leading to the generation of higher specific mechanical energy required for the breakdown of the starch structure, protein denaturation and formation of a highly expanded product.

At the same barrel moisture content,

a slightly higher expansion ratio was obtained in the final expanded product made from sorghum flour compared to either the corn grit or the mixture of corn and sorghum (Figure 1). Analysis of the texture, using an Instron universal testing machine (Instron 5564, England) fitted with a Kramer cell, showed that the product made from sorghum was crispier compared to corn or mixed corn and sorghum product (Figure 2). This indicated that sorghum flour is a suitable raw material for imparting a desirable crispy texture functionality to an expanded snack product.

A modified in vitro cereal protein digestibility assay, with a combination of oral, gastric and small intestinal digestive phases, was developed at CSIRO's Food Innovation Centre in Werribee, Victoria, to get a better representation of the human digestion system of extruded sorghum based products. The study showed that the protein digestibility increased from 25.49 per cent in conventional cooked sorghum flour to 50.94 per cent in extruded sorghum products.¹¹ This may be due to the disruption of the cell walls and starch granules through the

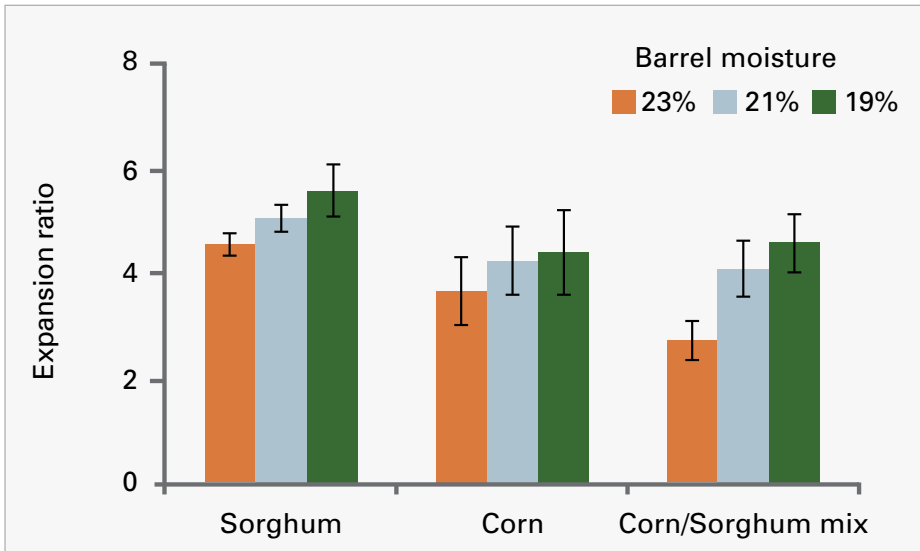


Figure 1: Expansion ratio of extrudates produced from sorghum, corn and corn/ sorghum (50:50) at a range of barrel moistures.

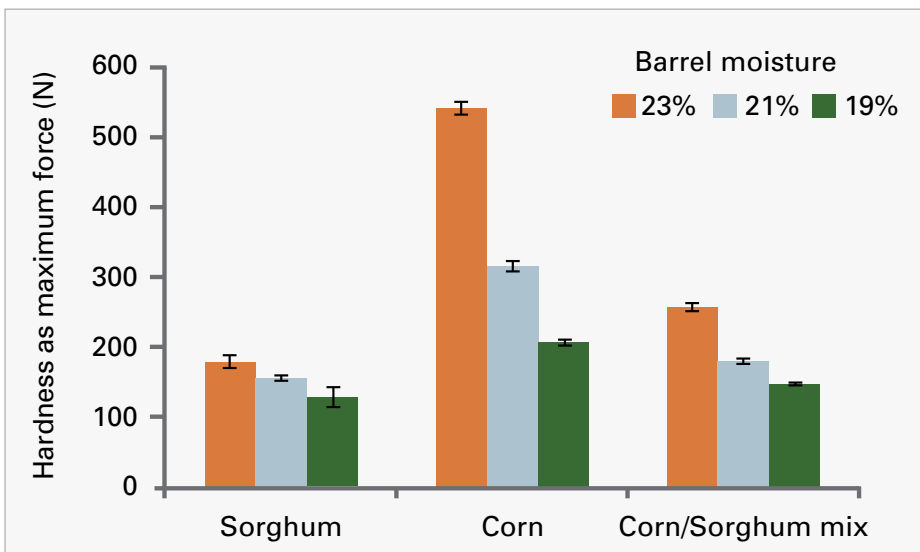


Figure 2: Hardness of expanded extrudates produced from sorghum, corn, and corn/ sorghum (50:50) at a range of barrel moistures.

extrusion process enabling immediate accessibility of enzymes to proteins¹² resulting in a product with an increased protein digestibility.

Future product opportunities

Sorghum is a grain with significant potential as a raw material for gluten-free food products. Modification of protein functionality in sorghum flour is an essential step in expanding its use in common cereal products such as bread, pasta and biscuits. The low-moisture

extrusion process helps improve the digestibility of sorghum protein to produce a crunchy expanded product. This process has potential applications to extend the use of sorghum in a range of products including snack foods and breakfast cereals such as a sorghum bubble and healthy snack bars.

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INDUSTRY NEEDS TO ADOPT WHOLE GRAINS CODE OF PRACTICE

Australians need more consistent messaging on the whole grain content of foods to reduce confusion and help people make better grain food choices.

Words by *Chris Cashman*

The Code of Practice for Whole Grain Ingredient Content Claims (the Code), launched in 2013 and developed through consultation with the food industry, public health and nutrition research community, sets a standard for labelling of whole grain foods, which can vary widely in whole grain content.

The Grains & Legumes Nutrition Council (GLNC), the independent authority on the nutrition and health benefits of grains and legumes, hosted a briefing event in November to provide the latest updates on the Code, including its uptake, impact, opportunities for food manufacturers, as well as the consumption and research trends, food innovation and insights, and suggestions on how to educate consumers to look for foods higher in whole grain. Here are the highlights...

Code of Practice for Whole Grain Ingredient Content Claims

The Code provides an industry standard for whole grain ingredient content claims, and is a tool to enhance the promotion of whole grain foods and ultimately help people make better choices.

In addition to whole grain intakes falling below recommendations, a key market research insight which informed the development of the Code, was that people had a poor understanding of which foods contain whole grain, and mixed perceptions on the benefits of whole grains. Importantly, they also wanted clarity. Unlike nutrition content claims which are regulated by the Australia New Zealand Food Standards Code, there is no regulation for whole grain content claims, and a wide diversity in claims being used

on foods labelled as whole grain can vary from 1.4g to 75g per serve.¹

With the support of the grains food industry, public health and nutrition research community, GLNC developed the Code, a voluntary industry standard to guide the grains food industry on the use of whole grain ingredient content claims on pack, and in promotion of foods.

The success of the Code in providing clear and consistent whole grain content claims on pack and in promotion of foods requires wide uptake from the grains food industry. To date, 15 major companies have taken a leadership role in signing up as Registered Users and aligning their use of whole grain ingredient content claims with this industry standard. These include Goodman Fielder, Sanitarium, George Weston Foods, Nestlé, Simplot, Cereal Partners Worldwide and Bakers Delight. A full list of Registered Users and Registered Products is available at www.glnc.org.au.

Using data obtained from GLNC's 2014 Grains and Legumes Product Audit, which surveyed grain foods available to Australians at the four leading retailers, GLNC estimates that currently Registered Products represent 68 per cent of breads and 45 per cent of breakfast cereals that are eligible for registration with the Code.¹ This is a significant achievement, as breads and breakfast cereals are the leading contributors of whole grain within the Australian diet.²

The provisions for the use of whole grain ingredient content claims outlined in the Code are summarised in Table 1 (next page), and there is no fee for food manufacturers to become Registered



Users of the Code or for Registered Products to use whole grain ingredient content claims aligned with the Code on pack and in promotions.

The key benefit of becoming a Registered User of the Code for manufacturers is to have a point of difference for foods or brands higher in whole grain, which can demonstrate to consumers that their whole grain product adheres to the Code, as well as leveraging GLNC's consumer education strategy and activities. For more information on the Code of Practice for Whole Grain Ingredient Content Claims, visit www.glnc.org.au/codeofpractice.

Whole grain research, recommendations and consumption

Rebecca Williams, nutrition communications officer of GLNC, outlined the latest research on the benefits of whole grains including wheat, oats, brown rice, oats, barley, rye, sorghum, millet, triticale, teff, quinoa, amaranth and buckwheat, as well as foods made with whole grain ingredients such as breads, breakfast cereals and crispbreads.

As whole grains are nutrient and fibre rich, naturally low in saturated fat and salt and deliver a range of protective phytonutrients, it is not surprising the Australian Dietary Guidelines (the Guidelines) encourage Australians to 'enjoy grain (cereal) foods, mostly whole grain and/or high cereal fibre varieties'.³ In addition to the nutritional contribution of whole grains, the Guidelines recognise the body of evidence which suggest habitual higher whole grain intake (greater than or equal to three serves per day) is linked with reduced risk of cardiovascular disease, type 2 diabetes, weight gain and colorectal cancer. In addition to the Guidelines, adults are encouraged to meet the 48g whole grain Daily Target Intake (DTI) for a reduced risk of coronary heart disease.^{4,5}

In recent years, since the publication of the Guidelines, the body of evidence supporting the consumption of higher intakes of whole grain with reduced risk of an early death and chronic disease has strengthened.⁶⁻¹⁰ One such review, which provides a comprehensive analysis of the health protection offered by various food groups, reported that higher intake of whole grains offered the greatest protection against chronic disease of any food group – more protective than other plant food groups.⁸

Despite dietary recommendations and the growing body of evidence for the benefits of whole grain intake, the GLNC 2014 Australian Grains & Legumes Consumption & Attitudinal Study (the Consumption Study), which canvassed the habits of more than 3000 Australians aged two to 70 years, identified that the majority of Australians are not eating enough

Table 1: Whole Grain Ingredient Content Claim Levels

Whole grain ingredient content per manufacturer serve	Permitted whole grain ingredient content claim	
Less than 8 grams whole grain	No whole grain ingredient content claim permitted	
At least 8 grams whole grain	Contains whole grain	The whole grain Daily Target Intake Statement and/or a factual statement about whole grain content.
At least 16 grams whole grain	High in whole grain	
At least 24 grams whole grain	Very high in whole grain	

whole grain foods, with 70 per cent of people aged 15-70 years not meeting the three or more serves of whole grain foods each day, putting themselves of increased risk of chronic disease.²

As shown in Table 2 (next page), every age and gender group is falling short of recommendations.

This disparity between whole grain recommendations and current intakes reinforces the need for greater awareness of the nutritional benefits and clear and consistent whole grain ingredient content claims to help people make better food choices.

Whole grain consumer trends, food innovation and insights

Sarah Hyland, AIFST's general manager of commercial services, utilised GLNC's 2014 Consumption Study as well as a wealth of consumer insights from her background in food and beverage market research, to explore whole grain consumer trends and the nature of the influences and messaging that shapes consumers attitudes towards whole grains.

The top line findings from the Consumption Study found that many Australians are not meeting the Australian Dietary Guidelines minimum recommendations for daily core grain* serves and daily serves of core grain

food reduced by almost one third (29 per cent) between 2011 and 2014.

Closer interrogation of the data revealed that the decline in total core grain food intakes is mostly driven by significant decreases in the number of people eating refined options, such as white bread and plain or sweetened ready-to-eat cereals. While refined core grain food intake has declined, the number of people reporting they ate mueslis and wheat breakfast biscuits – both very high in whole grain – as well as gluten-free breads and fruit breads, actually increased between 2011 and 2014.²

The decrease intake in core grain serves and failure of many people to meet minimum recommendations for core grain foods is driven by widespread misconceptions and a lack of understanding about the health benefits of grains. Attitudinal responses from the Consumption Study highlighted widely held misconceptions which included that limiting core grain foods, including whole grains, improves weight management and that grains do not contribute to a healthy digestion (rather they cause bloating or digestive discomfort) nor do they make an important contribution to a healthy diet.² In contrast, rather than contributing to obesity, digestive problems and

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inadequate nutrient intakes, the scientific evidence demonstrates that whole grain and high-fibre grain foods are an important part of the solution to these issues, within a balanced diet.

In recent times, proponents of paleo diets have been a leading source of misinformation around grains and whole grains through unsubstantiated claims and recommendations in contrast to evidence-based Guidelines.

Despite their ‘loud voice’, media monitoring performed by GLNC, which tracked print, online, radio and television stories between July and September 2015, demonstrates that coverage of grains and whole grains in the media has been 94 per cent favourable/neutral – meaning the story was either aligned with evidenced based Guidelines or provided a balanced discussion – versus only six per cent of ‘negative’ stories, which only provided information or recommendations in contrast to evidenced based Guidelines.

While advocates of the paleo diet fad have propelled unsubstantiated negative messages on whole grains into the media, in most cases (and increasingly) the discussion is becoming more balanced. People are talking more about grains and about making better grain choices more than ever before and this is an opportunity for public health and the grain food industry to educate consumers on the benefits of whole grain foods.

George Weston Foods Limited Case Study: Leveraging the Code through whole grain innovation and communications

Maddison Fox, nutritionist – marketing and innovation (Tip Top Division) of George Weston Foods Limited (GWF), explored how, as a Registered User, GWF has adopted and leveraged the Code through whole grain innovation and communications. With a recent portfolio review, GWF now has over 40 products registered with the Code, including products from iconic bread

Table 2. Average daily serves of whole grain.

	Males	Females
2-8 years	1.3	1.2
9-13 years	1.5	1.4
14-18 years	1.3	1.8
19-30 years	3.0	1.2
31-50 years	2.7	1.6
51-70 years	1.3	1.2

and bakery brands such as Tip Top®, Abbott’s Village Bakery, Burgen, Golden and Bazaar.

As an example of product innovation with whole grains and whole grain claims, Ms Fox showcased the product Tip Top® Breakfast Toast, which was successfully launched in April 2014. Made using wholemeal flour, Tip Top® Breakfast Toast is a Registered product with the Code and utilises the whole-grain Daily Target Intake statement in the format of a split claim, with “70% of your daily target of whole grains” on the front of pack, accompanied by the full Daily Target Intake statement on the back of the pack in alignment with the Code.

In addition to recent innovation and alignment to Code, Tip Top has also demonstrated industry leadership through its recent ‘A Grain of Truth’ campaign. The campaign, a response to the increase in negative noise in the media about carbs and bread, is calling on Australians to farewell fads and embrace a sensible long term approach to healthy eating, in light of the scientific evidence. It also aims to bust some long-held myths and confusion about bread along the way, and is the start of an ongoing journey.

Ms Fox detailed the highly successful campaign activities to date, which included partnering with GLNC for insights and messaging, a national consumer study with Galaxy Research, media and blogger outreach, media relations campaign, and the development of educational content on the campaign microsite, agrainoftruth.com.au.

*Core grain foods include breads, breakfast cereals, crispbreads, rice, pasta and noodles and excludes discretionary grain food choices such as cakes, biscuits, pastries and bars which are higher in added salt, sugar or fat. Core grain foods include refined options as well as foods which contain whole grain or are high in fibre.

Chris Cashman is an accredited practising dietitian and nutrition program and Code of Practice manager at the Grains & Legumes Nutrition Council.

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CSU'S NEW FUNCTIONAL GRAIN CENTRE

Charles Sturt University, in partnership with the Australian Research Council, has launched the Functional Grains Centre to help the Australian Grains industry innovate.

Words by *Chris Blanchard*

Innovation is the key

The grains industry has undergone quite a bit of turmoil for more than a decade. Not since the heady days of 1998, when the industry was a vibrant hub of grain quality research thanks to wheat and rice cooperative research centres (CRCs), has the industry benefited from quality scientific research. The privatisation of wheat breeding, the decline in state government investment in cereal quality research, the fallout from AWB Ltd and the prolonged drought of the early 2000s pushed the grain quality discipline significantly into decline.

If the Australian grains industry is to survive, innovation is the key. We cannot compete with international players due to our production costs but we can compete when it comes to developing the best quality grain in the world.

Grains research at Charles Sturt University

Charles Sturt University (CSU) has been active in grain quality research since the implementation of its food science program in the late 1990s. During this time, various research projects have been completed from bioactive compounds in faba beans, to the production of peptides from canola meal that demonstrate some remarkable pharmaceutical benefits.

CSU's grain quality research program is providing an important service to the Australian grains industry through the training of grain science professionals, and generating new science for the industry. However, funding grain quality research has been challenging, with many organisations such as the Grains Research and Development Corporation (GRDC) more focused on the production aspect of the industry.

The private breeding sector is still maturing and their focus is also



RC ITTC for Functional Grains director Chris Blanchard (left) with PhD students working in the Centre and ARC executive director Dr Fiona Cameron (rear centre).

largely on grain production rather than quality. There are a number of companies in Australia with an interest in grain quality; however, they often lack the expertise to undertake comprehensive research projects.

A way to address this research-funding gap was to access the recently implemented Australian Research Council Industrial Transformation Training Centre (ARC ITTC) program, which aims to bring industry partners and researchers together to transform Australian industries.

CSU collaborated with a number of industry partners to apply for an ARC ITTC grant and were successful in receiving funding for a Training Centre in the area of grain functionality.

The Functional Grains Centre

Last February, ARC executive director Dr Fiona Cameron launched the ARC ITTC for Functional Grains (Functional Grains Centre or FGC) in Wagga Wagga, NSW. The aim of the FGC is to transform the Australian grain industry from a low-value commodity industry into a high-value food and feed industry.

To achieve this, CSU has partnered

with several industry and research partners to conduct grain quality research projects and train the next generation of grain scientists. The partners include SunRice, the NSW Department of Industry, GrainGrowers Ltd, MSM Milling, Woods Foods, Flavourmakers, Teys/Cargill, Grains & Legume Nutrition Council, Intersect and CSIRO.

The funding provided by ARC, CSU and industry partners, allows the recruitment of three postdoctoral scientists and 10 PhD students. Many of the students were recruited prior to the FGC launch.

Some of the projects that the PhD students will be focusing on at the FGC include measuring the health properties of bran from coloured and white rice, investigations into the glycaemic index of rice, the development of a new rice-based functional food ingredient and many more developments of grain-based products with enhanced health attributes.

The Functional Grains Centre will be funded for the next three years. ●

Professor Chris Blanchard is the executive director of the ARC Industrial Transformation Training Centre for Functional Grains.



SENSORY AND CONSUMER RESEARCH UPDATE

What's new? Recent highlights in sensory research.

Words by Drs Russell Keast, Gie Liem, Megan Thornton and Dieuwerke Bolhuis

Fat, salt and sugar – a new tool to measure liking

It is widely accepted that we eat too much fat, salt and sugar, which all ultimately leads to diet-related disease. We also know that fat, salt and sugar are generally palatable in foods and contribute to overconsumption - this is especially true during the festive season!

Understanding the relationship that exists between fat, salt and sugar and our liking for them in foods is complex and previous studies have examined their influence on liking and consumption, usually in model foods.

Research led by Pascal Schlich comprising of eight sensory laboratories in France, 144 foods and 500+ subjects aimed to develop a database of a variety of foods that are representative of the overall liking and could be applied to understand why obese people overconsume some food types.

The number of foods used in the study was reduced to 32 for practical reasons; for instance, chocolate mousse was highly liked regardless of the sucrose content, or the tomato juice was also well appreciated even without fat, salt or sugar addition. Then, for each subject and each product, hedonic ratings were fitted versus the level of fatty, sweet or salty content in a quadratic regression, from which the predicted optimal level was derived. The flavour profiles of the 32 foods was determined by a descriptive analysis panel.

The sensory profile showed that the mean perceived intensity of fatty, salty and sweet significantly increased in a linear manner with the nutrient level. In contrast, the overall liking scores followed an inverted U-shape centred on the middle level of lipids, sodium chloride or sucrose.



Internal validity and consistency of the items compounding the sensations of fatty, salty or sweet were demonstrated. In theory, we can now measure liking of some of the foods used in lean and obese populations and determine if liking differs between the two groups – time will tell if this is a worthwhile approach.

Urbano, *et al* (2016) Development of a sensory tool to assess overall liking for the fatty, salty and sweet sensations. *Food Quality and Preference* 48 p23-32

Beer aroma: Just in time for summer

It is commonly known that different chemical isomers (chemicals whose bonds allow for mirror images of one another, just like our left to right hand) may have different effects when bound within our body. But did you know that they can also have different aromas?

Researchers in Belgium have researched the compound theaspirane (or 2,6,10,10-tetramethyl-1-oxa-spiro[4,5]-deca-6-ene), an aromatic compound with four isomers (due to

two chiral positions). Among these four isomers, three different aromas are exhibited, camphor (two isomers), fruity or blackcurrant, as well as unpleasant or naphthalene.

Theaspirane has previously been identified in beer and wine, in both free and glycosidic/bound (attached to a sugar molecule) forms. When oxidised, theaspirane degrades to form two other aromatic products, which smell like dried fruit (dihydrodehydro- β -ionone) and grenadine (4-hydroxy-7,8-dihydro- β -ionone). The researchers therefore aimed to look at the effect of beer ageing on the degradation of theaspirane as the presence and quantities of each precursor, isomer and degradation product would affect the different odorants produced.

Firstly, the researchers treated theaspirane with peroxide and a catalyst to look at other oxidation products which may be produced through beer ageing. As well as those dried fruit and grenadine-smelling compounds, four other degradation products were identified for the first time, however none of these had any detectable odour.

The analysis of extracts from four types of Belgian hops (Amarillo, Citra, Hallertau Blanc and Mosaic) for theaspirane precursors, isomers, and the six degradation products, as well as all of their glycosidic forms, was then performed by GC-MS. Mosaic was the only hops to contain the non-glycosidic forms, while the Citra and Amarillo varieties contained relatively high quantities of the theaspirane isomers (111 and 2290mg/kg respectively). When these same extracts were treated with β -glucosidase (an enzyme to cleave sugars from glycosidic compounds), the Hallertau Blanc hops variety exhibited

the greatest quantity of the dried-fruit aroma compound.

Finally, Caroline Scholtes and co-workers studied the quantities of the theaspirane isomers and degradation products in fresh and two-year-old Belgian beer, and found concentration ranges for theaspirane isomers remained the same despite unavoidable oxidation in the bottles. However, the degradation products, while present in small quantities in the fresh beer, degraded in the aged sample to unquantifiable levels.

So while drinking your Christmas present of Belgian beer this summer, make sure you analyse for those blackcurrant, grenadine and dried fruit notes.

Scholtes C *et al* (2015). Occurrence of Theaspirane and its Odorant Degradation Products in Hop and Beer. *Journal of Agricultural and Food Chemistry* 63: 8247-8253

The role of olfactory and auditory cues in attraction to high energy dense food

Humans make more than 200 food-related decisions per day, but are only consciously aware of less than 10 per cent of these choices. Food-related cues such as odours, images, messages, commercials and so on, are abundant in our environment and unconsciously affect our food choice. Researchers from the Taste and Nutrition Centre (Centre des Sciences du Goût et de l'Alimentation) in Dijon, France have investigated how an appealing 'chocolate croissant' odour or a healthy 'nutritional message' on the radio influenced food choice. The chocolate croissant odour was obtained by baking real chocolate croissants in the oven. The auditory message was embedded in a radio program and is translated as 'For your health, avoid eating too fatty, too sweet, or too salty'. 147 participants were divided in four groups: 'odour exposure', 'message exposure', 'odour and message exposure' or 'control'. Participants were exposed to the odour and/or message for exactly 15 minutes. Following the 15 minutes, participants were moved into a non-odorised room and were asked to choose from low energy dense and high-energy dense dishes served in buffet style, what they actually would have eaten for lunch.

The participants who were exposed

to the chocolate croissant odour tended to choose a high-energy dense dessert (waffle) more frequently than a low-energy dense dessert (fruit). This means that a food-related attractive food-related odour may stimulate intake of high-energy dense food.

This is in line with an earlier study that shows that odours influence specific appetite (Ramaekers *et al*, *International Journal of Obesity*, 2014; 38(5)). For example, a savoury odour was found to increase appetite for savoury foods, and sweet odour was found to increase appetite for sweet foods.

Unexpectedly, participants who were exposed to the auditory 'health' message chose to consume the high-energy dense dessert more often than participants who did not hear the message. The authors state that the effectiveness of these public health messages on the radio call into question and that responses of individuals on public health prevention campaigns are difficult to predict.

Chambarona S, *et al*. (2015) Impact of olfactory and auditory priming on the attraction to foods with high energy density. *Appetite*, 2015 (95) 74-80.

Importance of understanding your consumers

In previous issues of this section in *food australia*, we notified you about the growing interest in consumer and sensory research with Chinese consumers. The potential of convincing only one per cent of the potential 1.3 billion consumers in China to buy your product is extremely attractive for many food businesses. The number of publications about Chinese consumers has rapidly increased in the past five years. Recently Food Quality and Preference published two studies from New Zealand's University of Otago, which investigated Chinese consumers' quality perception and views about processing technology. One study suggested that Chinese migrants in New Zealand perceived processing technology such as pasteurisation and high-pressure technology as positive drivers of quality, unlike Western consumers (Zhang *et al* 2015). This might be linked to Chinese consumers' ongoing worries about the safety of food products. Also, the way packaging cues freshness differentiates Chinese from Western consumers. That is,



Chinese consumers appear to have a strong negative association with opaque plastic bottles. Another study of the same group in New Zealand confirmed these findings, suggesting that front-of-pack information about processing technology can positively impact Chinese consumers' acceptance of apple juice (Lee *et al* 2016). A study with wine labels suggest preferred colour settings on wine labels do not seem to follow the 'generic' Chinese colour preferences. That is, red was not the preferred dominant label colour in wine labels, whereas the colour red is mostly preferred by Chinese consumers in other contexts (Tang *et al* 2015). It is expected that future research will discover more consumer differences between Chinese and Western consumers. Single foods, such as milk and wine, are expected to generate a lot of interest because they are among the strongest growing markets for imported foods in China. 

Pui Yee Lee, *et al*. (2016) Effect of information on Chinese consumers' acceptance of thermal and non-thermal treated apple juices: A study of young Chinese immigrants in New Zealand. *Food Quality and Preference*, 48(A), 118-129

Ting Zhang *et al*. (2016) Understanding young immigrant Chinese consumers' freshness perceptions of orange juices: A study based on concept evaluation. *Food Quality and Preference*, Volume 48(A), 156-165

Vicky Chi Man Tang *et al*. (2015) Perception of wine labels by Hong Kong Chinese consumers. *Wine Economics and Policy*, 4 (1), 12-21

Drs Russell Keast, Gie Liem, Megan Thornton and Dieuwerke Bolhuis are members of the Centre for Advanced Sensory Science (CASS) at Deakin University, Victoria.

NUTRITION WATCH

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

Words by *Dr Ramon Hall*

Specialised proresolving lipid mediators in individuals with metabolic syndrome

In a study undertaken by the University of Western Australia, researchers have investigated the plasma levels of specialised proresolving lipid mediators (SPMs) in men and women with and without metabolic syndrome in response to intakes of n-3 fatty acids and aspirin. The authors describe that metabolic syndrome is associated with a chronic low-grade inflammatory state, which may affect the ability to resolve inflammation.

Resolution of inflammation is an active process that involves specialised proresolving lipid mediators (SPMs) that are derived from n-3 (v-3) fatty acids and is important to maintenance of a healthy immune system. SPMs derived from omega-3 (EPA and DHA) are known to terminate neutrophil infiltration in injury sites, control neutrophil apoptosis and clearance of apoptotic neutrophil by macrophages, which thereby help return inflamed tissue back to normal. Aspirin is utilised in the experiment, as it is known to help in the synthesis of some of these important SPMs from EPA.

The study was a four-week parallel design trial involving 22 volunteers with metabolic syndrome and 21 healthy matched control volunteers. Both of these groups took 2.4 grams/day of omega-3 fatty acids for four weeks and were also given 300 milligrams/day of aspirin for the final seven days of the trial. Blood samples were collected at baseline and at the end of weeks three and four and SPMs were measured with the use of liquid chromatography-tandem mass spectrometry. The



SPMs of particular interest included: 18-hydroxyeicosapentaenoic acid (18-HEPE), E-series resolvins, 17-hydroxydocosahexaenoic acid (17-HDHA), D-series resolvins, 14-hydroxydocosahexaenoic acid (14-HDHA), and maresin-1.

The results of the study revealed that there was an increase in SPM precursors 18-HEPE, 17-HDHA, and 14-HDHA after omega-3 fatty acid supplementation but there was a significantly attenuated in the individuals with metabolic syndrome. The exception was with the E-series resolvins which increased to a similar extent in both control and metabolic individuals. Also, D-series resolvins did not increase from baseline levels in either group following omega-3 fatty acids supplementation. Interestingly, the addition of aspirin to the omega-3 fatty acids did not alter levels of SPMs in either group.

The authors concluded that, "This study has shown that E-series resolvins were increased to a similar extent in

MetS subjects and controls after n-3 fatty acid supplementation and were not altered by the addition of aspirin. However, volunteers with MetS had reduced concentrations of E- and D-series resolvins precursors as well as of 14-HDHA in response to n-3 fatty acid supplementation.

These findings may have significance, as 17-HDHA is biologically active. Our study shows that individuals with the MetS have sufficient 18-HEPE available for the synthesis of E-series resolvins after n-3 fatty acid supplementation. However, additional studies of n-3 fatty acid supplementation in the MetS are required to determine whether reduced concentrations of 18-HEPE, 17-HDHA, and 14-HDHA affect the ability of MetS patients to mount an appropriate response to infection."

The results of this study should be of interest to manufacturers considering the use of omega-3 fatty acids in relation to the immune system and practitioners prescribing omega-3 fatty acids to patients.

Barden *et al.* (2015) Specialized proresolving lipid mediators in humans with the metabolic syndrome after n-3 fatty acids and aspirin. *American Journal of Clinical Nutrition*, published online ahead of print (11 November 2015) (doi: 10.3945/ajcn.115.116384).

Mediterranean-style diets can help type 2 diabetes patients

Researchers from the Tongji Medical College at the Huazhong University of Science and Technology, Wuhan, China, have undertaken a study to investigate the effects of a Mediterranean-style diet on glycemic control, weight loss and cardiovascular risk factors among type 2 diabetic individuals. The authors suggest the Mediterranean-style diet (MSD) may improve glucose metabolism in patients with type 2 diabetes (T2D), although the results are not always consistent. The authors describe the Mediterranean-style diet as a collection of food habits traditionally followed by people of different regions in the Mediterranean basin, characterised by a high consumption of vegetables, monounsaturated fatty acids (primarily from olive oil), fruits, cereals and legumes, as well as a low consumption of red or processed meat.

The researchers therefore decided to undertake a meta-analysis of randomised controlled trials to explore

the effects of MSD on glycemic control, weight loss and cardiovascular risk factors in T2D patients. They undertook searches of EMBASE, Cochrane Library and PubMed databases up to February 2014 and included randomised controlled trials that compared the MSD with control diets in patients with T2D. The effect size was estimated as mean difference using a random effect models.

The meta-analysis included nine studies with a total population of 1178 patients. The results reveal that compared with control diets, MSD led to greater reductions in haemoglobin A1c (mean difference, -0.30), fasting plasma glucose (-0.72 mmol/l), fasting insulin (-0.55 μ U/ml), body mass index (-0.29 kg/m²) and body weight (-0.29 kg). Also, concentrations of total cholesterol and triglyceride were decreased (-0.14 mmol/l; and -0.29 mmol/l, respectively), and high-density lipoprotein was increased (0.06 mmol/l). In addition, MSD was associated with a decline of 1.45mmHg for systolic blood pressure and 1.41mmHg for diastolic blood pressure.

The authors concluded that, "Our meta-analysis provides convincing evidence that MSD has a more prominent role in the management of



T2D. The results suggest that MSD is effective in improving glycemic control (HbA1c, FPG and fasting insulin), losing weight (BMI and body weight) and meliorating lipid profile and blood pressure in people with T2D. These findings are of considerable public health interest, particularly for helping health administrators to identify effective dietary strategy of diabetes."

This study should be of interest to manufacturers of products containing



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Create change

key ingredients associated with the Mediterranean diet (such as olive oil) and manufacturers of products pitched at type 2 diabetics, as well as researchers and practitioners with an interest in T2D.

Huo *et al.*, (2015). Effects of Mediterranean-style diet on glycemic control, weight loss and cardiovascular risk factors among type 2 diabetes individuals: a meta-analysis. *European Journal of Clinical Nutrition*, 69, 1200-1208 (doi: 10.1038/ejcn.2014.243).

Nutrition and hearing loss

Two associated with nutrition and hearing loss were featured in a recent edition of *The American Journal of Clinical Nutrition*, accompanied by a supporting editorial by Emmett and West (2015). It is estimated that hearing loss affects between 360 to 554 million adults and children in the world. These estimates do not include milder hearing loss, which still has a consequential impact on individual and the magnitude depends on the hearing loss threshold adopted (which is not universal).

The editorial highlights that there is a disproportionately high prevalence of hearing loss in low-resource settings, such as in South Asia and sub-Saharan Africa. The estimates reveal a disability that appears early in life and increases several-fold over the lifespan.

Emmett and West highlight that hearing loss has a profound impact on health, social and economic consequences. They note that population studies in higher income countries suggest that there is potential protection from hearing loss in adults with higher dietary intakes of fish, long-chain PUFAs, folate, b-carotene and vitamins A, E, and C.

They also indicate that dietary exposure to potentially ototoxic heavy metals (e.g. cadmium, lead), a high BMI and waist circumference (i.e. obesity) and reduced physical activity, have also been linked to hearing loss. Additionally, they highlight that in low-income countries, where undernutrition is widespread, research has indicated that micronutrient deficiencies (vitamin A and zinc) as risk factors for otitis media, the leading acquired cause of childhood hearing loss.

In the same journal, Curhan *et al.* (2015), from the Department of Medicine, Brigham and Women's Hospital, Boston, USA, have prospectively examined the relation between carotenoids, vitamin A, vitamin C, vitamin E, and folate intake and risk of self-reported hearing loss in women.

This study was undertaken because higher intakes of certain vitamins were thought to protect against cochlear damage from vascular compromise and oxidative stress and thereby reducing risk of acquired hearing loss. This prospective cohort study followed 65,521 women in the Nurses' Health Study II from 1991 to 2009, using questionnaires related to diet. From a total of 1,084,598 people with years of follow up, 12,789 cases of incident hearing loss were reported.

The study revealed modest but statistically significant inverse associations, between higher intake of b-carotene and beta-cryptoxanthin and risk of hearing loss. Additionally, higher vitamin C intake was associated with higher risk; in comparison with women with intake, <75 mg/d, with vitamin C intake ≥ 1000 mg/d (mainly supplemental). There was no significant trend between intake of vitamin E intake and risk. The authors said, "Higher intakes of b-carotene, b-cryptoxanthin, and folate, whether total or from diet, are associated with lower risk of hearing loss, whereas higher vitamin C intake is associated with higher risk."

The second study in the same journal was conducted by Choudhury and colleagues (2015) from the Department of Neonatology, Department of Otorhinology and Cochlear Implant Unit, at Sir Ganga Ram Hospital, New Delhi, India. They investigated whether in utero iron status is associated with auditory neural maturation in late preterm and term infants. Infants with a gestational age ≥ 34 weeks were eligible unless they met the exclusion criteria for a range of medical conditions that may impact on the findings. The measurement of auditory waves were evaluated by auditory



brainstem response within 48 hours after birth, compared with infants with latent iron deficiency (serum ferritin ≤ 75 ng/mL) and infants with normal iron status (serum ferritin > 75 ng/mL) at birth. The results reveal that infants with latent iron deficiency had significantly prolonged wave V latencies, III-V interpeak latencies, and I-V interpeak latencies compared with infants with normal iron status. These differences remained significant on regression analyses after controlling for confounders factors. The authors concluded: "Latent iron deficiency is associated with abnormal auditory neural maturation in infants at ≥ 34 week gestational age."

Taken together, these studies and associated editorial provide suggestive evidence that adequate nutrition across the life spectrum are important to help prevent hearing loss. ¹⁰

Emmett and West (2015), Editorial: Nutrition and hearing loss: a neglected cause and global health burden, *American Journal of Clinical Nutrition*, 102; 987-988, (doi: 10.3945/ajcn.115.122598).

Curhan SG, Stankovic KM, Eavey RD, Wang M, Stampfer MJ, Curhan GC. Carotenoids, vitamin A, vitamin C, vitamin E, and folate and risk of self-reported hearing loss in women. *American Journal of Clinical Nutrition* 2015;102:1167-1175, (doi: 10.3945/ajcn.115.109314).

Choudhury V, Amin SB, Agarwal A, Srivastava LM, Soni A, Saluja S. Latent iron deficiency at birth influences auditory neural maturation in late preterm and term infants. *American Journal of Clinical Nutrition* 2015;102: 1030-1034, (doi: 10.3945/ajcn.115.113084).

Dr. Ramon Hall is principal scientist at NutraRegs – Nutrition and Regulatory Consulting and is an Honorary Senior Research Fellow at the School of Exercise & Nutrition Sciences, Deakin University.



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NEW SOUTH WALES

Charles Sturt University

Located in New South Wales' heart of agriculture, Wagga Wagga, Charles Sturt University offers the state's widest array of agricultural degrees. With a focus on agriculture, agricultural science and agricultural business management, the university also offers a food and nutrition undergraduate degree, and courses specialising in wine business and science.

Charles Sturt boasts a strong practical reputation with links to the Department of Primary Industries' Wagga Wagga Agricultural Institute as well as its own \$48.6 million National Life Sciences Hub.

The broad spectrum of agricultural courses on offer also gives students the opportunity to learn the business side to agriculture and viticulture, and its environmental impact.

University of New England

Based in Armidale, the University of New England (UNE) boasts five practically driven agriculture courses covering everything from land management to finance and specialist production.

On top of its three-year Bachelor of Agriculture, UNE also offers a course in agrifood systems where students can specialise in crop, livestock, horticulture or poultry production.

It also offers a double degree in agriculture and business, which gives students the opportunity to learn about farm and resource management, commodity markets, finance and banking, and crop protection methods.



University of New South Wales

University of New South Wales' food courses have a strong science and technology focus.

With two undergraduate courses in food science on offer, plus several postgraduate courses, UNSW applies its renowned engineering principles to the sector and focuses on the biological, chemical and physical sciences to understand everything about food.

The four-year course boasts nutrition and technology streams and is ideal for students interested in product design and development.

Southern Cross University

Southern Cross University offers a Bachelor of Exercise and Sport Science, majoring in Nutrition at its Coffs Harbour, Lismore and Gold Coast campuses, and a Bachelor of Science majoring in human biology at its Lismore campus and via distance education.

Both degrees are quite broad, with the opportunity to major in your area of interest. The human biology major

available in the science course looks at nutritional biochemistry and human metabolism, food ecology and food science, while the Nutrition major includes food science, biochemistry and nutrition specialist subjects.

University of Sydney

University of Sydney offers three undergraduate degrees in environmental systems, food and agribusiness, and science in agriculture. Its science in agriculture degree is highly regarded within government and industry alike and gives students a strong grounding in biosecurity, biotechnology, commodity trading, environmental science and crop production and protection.

The Bachelor of Food and Agribusiness is the ideal all-round course, providing students with the business skills as well as the scientific understanding of the agricultural industry. The three-year-course includes a 12-week internship and also has the flexibility to offer students career paths in food production or food business.



The Bachelor of Environmental Systems focuses on the environmental aspects of agricultural production including climate change, food security, water management and carbon emissions, and ideal for students interested in environmental management and conservation.

University of Newcastle

University of Newcastle's practical focus in its nutrition and dietetics course gives students over 1000 hours of practical experience over the four-year degree.

The Bachelor of Nutrition and Dietetics is the only food-based course on offer at Newcastle, is ideal for students wishing to pursue food and nutrition, and includes national accreditation with Dietitians Association of Australia.

University of Wollongong

An hour's drive south of Sydney, University of Wollongong offers a course in public health nutrition, ideal for students interested in working in health promotion, especially the development, management and evaluation of community-based nutrition and food policy programs. While still maintaining a strong scientific focus, this three-year course studies nutrition through its social impact.

University of Western Sydney

University of Western Sydney (UWS) offers courses in both food science and sustainable agriculture and food security. Based at its Hawkesbury campus, the agricultural course has a strong focus on sustainability and aims to give students the skills to problem-solve within an interconnected world of food security, agriculture, the environment, social stability and health.

Also at its Hawkesbury campus, UWS offers a Bachelor of Science (Nutrition and Food Sciences), which prepares students for careers in public health nutrition and health promotion.

TAFE Sydney Institute

Sydney TAFE offers a Certificate IV in Food Science and Technology, which equips students to work in technical

and supervisory roles across product development, food safety, food production and distribution across general food categories.



ACT

University of Canberra

University of Canberra (UC) offers undergraduate courses in human nutrition and public health, as well as postgraduate and masters courses in nutritional science, nutrition and dietetics.

Last October, the university appointed renowned nutrition expert Caroline Salisbury as Australia's first dietitian in residence, to improve the nutritional health of the university's community.

UC's suite of courses are best suited to those interested in nutrition education, food regulation, food science, public health and nutritional genomics.



QUEENSLAND

University of Queensland

University of Queensland (UQ) is the only Queensland university to offer courses in food science and technology, and agriculture and agribusiness.

UQ's School of Agriculture and Food Sciences offers undergraduate courses in agribusiness and sustainable agriculture. Its agribusiness course was restructured in 2015 and is taught across the university's Business School and School of Agriculture and Food Science, which are both ranked number one in Australia.

The sustainable agriculture course emphasises the livestock, poultry, agronomy and horticulture industries and the managerial strategies required to manage an international issue.

The university also offers post-graduate food science degrees.

Queensland University of Technology

Queensland University of Technology offers two nutrition-based courses in nutritional science, and nutrition and dietetics, with the option to pair

these courses with a degree in media and communications.

Its Bachelor of Nutrition Science examines the scientific principles that affect food, nutrition, diet and chronic disease and gives students the skills to work across government, educational, healthy and community organisations.

The Bachelor of Nutrition and Dietetics qualifies students as a dietitian, rather than a nutritionist, and is accredited by the Dietitians Association of Australia.

University of the Sunshine Coast

The University of the Sunshine Coast also offers two degrees in nutrition, and nutrition and dietetics. Both courses are hands-on, with practical hours woven throughout the four-year duration.

Students will learn about the food preparation, processing and preservation in the university's specialised teaching kitchens, with dietetics student also gaining the opportunity to consult real clients at the university's weight management clinic.

Griffith University

Griffith University offers nutrition courses from Masters to diplomas from its Gold Coast campus. The university's new Griffith Health Centre boasts a purpose-built teaching kitchen and nutrition clinic ideal for the traditional nutrition courses.

Griffith University also offers a Bachelor of Public Health in Health Promotion and Public Health Nutrition, which looks at major health issues including chronic disease, sexual health, nutrition, HIV/AIDS, physical activity, drugs, and alcohol within many populations including indigenous communities, youths, seniors and in workplaces, hospitals and schools.



VICTORIA

Monash University

Monash University is one of six Victorian educational institutions to offer courses in nutrition and dietetics. Monash University's Bachelor of Nutrition Science has a strong

foundation in nutritional science from food chemistry and composition to assessing dietary intake, coupled with developing strong research skills in the course's third and final year.

Deakin University

Deakin University offers courses on food and nutrition sciences across a range of levels in both the undergraduate and post-graduate streams. The university's Bachelor of Food and Nutrition Sciences is the largest nutrition course in Victoria, based out of Melbourne's Burwood campus. This course has a strong focus on consumer health while Deakin's Bachelor of Health Sciences is a more flexible option for those looking to pursue a career in the health sector.

La Trobe University

La Trobe offers both agricultural and nutrition-based undergraduate degrees. The Bachelor of Agricultural Sciences operates out of the Albury-Wodonga campus for the first year before transferring to Melbourne and includes the use of the brand new AgriBio, Centre for AgriBioscience. The Bachelor of Agriculture and Technology is vocationally focused and equips students with the skills to become an agronomist, agribusiness manager, aquaculture producer, winemaker or vineyard manager.

La Trobe also offers a Bachelor of Human Nutrition, which is focused on the biosciences and public health.

Marcus Oldham College

Marcus Oldham College offers specialist courses in agriculture and agribusiness from its Geelong campus. As Australia's leading rural business college, both courses are aimed at students keen to pursue management positions within agriculture production and businesses that deal with products of primary production.

University of Melbourne

University of Melbourne offers three courses in food science, agricultural science and agriculture.

The Bachelor of Agriculture will launch in 2016 and includes a semester of practical learning at the university's Dookie campus near Shepparton, which includes a high technology robotic dairy, broad acre farming crops and 5000 merino sheep.

The Bachelor of Science has the option to major in agricultural or food science. The agricultural stream is underpinned by scientific pillars applied to agriculture, while the food science major is suited for those following a career in food safety and regulation, nutrition assessment and quality assurance.

RMIT

Based in its Melbourne city campus, RMIT offers a Bachelor of Science majoring in food technology, and nutrition, with the option to study a Masters and PhD in food sciences. The Bachelor of Science (Food Technology and Nutrition) also includes time at the university's Bundoora campus. This double degree gives students both the food science engineering skills and with a wider nutritional understanding.

Federation University

Federation University offers a Bachelor of Food and Nutritional Sciences and a certificate IV. The courses cover everything from the scientific study of raw food

to marketing of the final product and gives students a well-rounded understanding of the food industry.

Victoria University

Victoria University offers a food science and nutrition honours option following its Bachelor of Science which gives students the opportunity to explore the science of food through a one-year research project.

North Melbourne Institute of TAFE/Melbourne Polytechnic

North Melbourne TAFE and Melbourne Polytechnic offer a variety of agricultural options for students, from a Cert IV in Agriculture, specialising in beef and sheep production, to a Bachelor of Agriculture and Technology majoring in agribusiness, agronomy, aquaculture and viticulture and winemaking. The undergraduate degrees are offered through Melbourne Polytechnic in conjunction with La Trobe University.

TASMANIA

University of Tasmania

The University of Tasmania offers two bachelor degrees in health science, and agriculture. The four-year agricultural degree focuses on the science behind agricultural production

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and sustainable resource management, while the health science course is a more general health course, which gives students an overall understanding of the health sector and acts as a pathway into a range of specialist areas, including nutrition and dietetics.

Australian Maritime College

Australian Maritime College, in conjunction with the Institute for Marine and Antarctic Studies, also offers an Associate Degree in Aquaculture. The degree equips students for work across all facets of production across finfish and shellfish, live feeds and algal culture, and systems maintenance.



SOUTH AUSTRALIA

Flinders University

On offer since 1977, Flinders University's Bachelor of Nutrition and Dietetics is one of the university's

most popular courses. It includes a significant science component, as well as a 21-week placement program and can be transferred into from similar degrees, including the Bachelor of Health Science, Nutrition stream.

University of Adelaide

Adelaide University offers a renowned degree in Agricultural Sciences, primarily at their Waite campus. The degree also includes a practical component in livestock production and agronomy, which gives students the skills to work in a range of areas across the agriculture spectrum.

The university also offers a Bachelor of Food and Nutrition Science, which includes a pre-dietetics pathway option.

University of South Australia


The Bachelor of Nutrition and Food Sciences offers study in both streams through studies in fundamental sciences linked to food and nutrition, health studies, food sciences and

human nutrition. In the third year, subjects focus on your chosen stream.

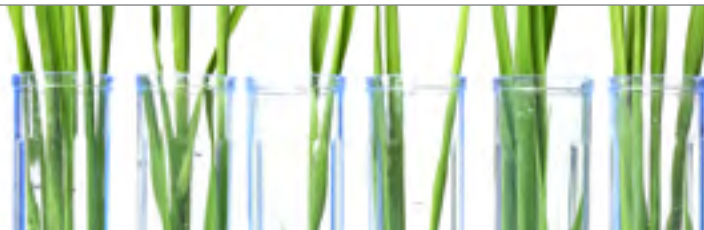


WESTERN AUSTRALIA

University of Western Australia

University of Western Australia prepares students for the increasingly important role placed on food production. It gives students the skills required for cropping and pasture sciences, livestock production, plant nutrition, soil science, agricultural economics, science communication, biology, genetics and land management. 

A list of courses and links to the universities are available on the AIFST website, www.aifst.asn.au/where-can-i-study.htm



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SUGAR IN THE DIET: IS THERE A SWEET SPOT?

A round-up of insights presented at ILSI SEAR Australasia's symposium, Sugar in the diet: is there a sweet spot? held in Sydney on 30 October 2015.

Words by *Cinthy Wibisono and Rhoda Ndanuko*

The International Life Sciences Institute (ILSI) Australasia held a symposium in Sydney on Thursday, 30 October 2015 on *Sugar in the diet: is there a sweet spot?* President ILSI Australasia, Ms Kim Tikellis, welcomed more than 85 participants to the seminar to help understand the role of sugar in the diet, identify potential scientific research gaps and understand consumers' perceptions, attitudes and behaviour. Here are the highlights...

Mr Bill Shrapnel of *Shrapnel Nutrition Consulting* discussed the evolution of the sugar and health debate. He attributed this to more than 35 years of Australian Dietary Guidelines health messages focused on low fat and relatively high carbohydrate diet, resulting in insufficient emphasis on lowering sugar intake. While sugar has been noted as a risk factor for developing dental caries by Australian and global health organisations, Mr Shrapnel recommended a more comprehensive review of current literature, investigating the health effects of high carbohydrate diets on cardiometabolic health.

Dr Alan Barclay, *consultant dietitian and nutritionist*, presented the historical perspective of sugars, commencing with honey as our first sweetener, with evidence of consumption during the Stone Age, among the ancient Egyptians and Chinese officials and the Middle Ages.

Dr Barclay explained that high fructose corn syrup was introduced in between 1975 and 1985, replacing sucrose as the preferred sweetener in

the USA. Alternate sweeteners such as saccharin, xylitol, aspartame, sucralose and stevia were developed. In 2014, a World Health Organization (WHO) meta-analysis showed that increased sugar intake was associated with weight gain, but no evidence of a dose-response association was found. Dr Barclay noted that Dietary Guidelines have always recommended strategies to eat less added sugar. In 2015, WHO has also recommended a reduction of free sugars to less than 10 per cent of total energy intake with suggested further reduction to below five per cent.

Ms Danielle Baird, *research project officer from CSIRO Food and Nutrition*, looked at data on 'apparent' and 'actual' Australian sugar consumption. Ms Baird highlighted that defining sugar was complex, with varying terminologies used in research literature and on food labels and reinforced the importance of health professionals providing accurate definitions to alleviate consumer confusion. Data sourced from the Australian Bureau of Statistics (ABS) and McNeill & Shrapnel showed a decline of 13 per cent in apparent sugar consumption from 1939-2011.

This trend was also reflected in actual consumption data from the Australian Health Survey 2011-13, which draws on self-reported consumption data from the National Nutrition and Physical Activity Survey 2011/12. Overall, Australians consumed an average 105g of total sugar daily, with males being the larger consumer at 116g total sugar per day compared to females at 94g per day.

Professor Luc Tappy, *University of Lausanne in Switzerland*, presented on the physiological and pathological effects of sugars, as well as an overview of current global sugar research. Professor Tappy began his presentation by outlining that nutrition recommendations for sugars exist, as sugar is composed of glucose plus fructose, and all body cells can use glucose as an energy substrate. Fructose is converted into lactate, glucose or fatty acids in the liver with ~5% energy loss. Glucose production and oxidation is slower with mixed meals. Some epidemiological studies show a positive association between added sugar and sweetened beverages (SSBs) with body weight, but this depends on adjustment for energy intake.

Presenting an overview of current global sugar research, Professor Tappy explored the epidemiological and short-term studies demonstrating the role that SSBs play in the pathogenesis of metabolic diseases. Although mechanistic and intervention studies suggest high fructose intakes can lead to adverse metabolic effects, no safe upper limit level has been defined.

Studies investigating the hedonistic effects of sugar in terms of inducing satiety or appetite stimulation report conflicting results. These studies highlight the complexities of homeostatic responses underlying physiological responses to food intake, such as the influence of taste receptors. Professor Tappy proposed the need to consider various components of the diet such as fibre content, glycaemic load or whole grain foods in seeking appropriate carbohydrate sources to replace sugar.

Ms Megan Cobcroft, food policy analyst with the NSW Department of Health, outlined the steps undertaken by NSW Health to develop a policy position for sugars and implementation recommendations aligned to the NSW Healthy Eating and Active Living Strategy 2013-2018. This includes a review of healthy food provision guidelines for hospitals and schools in NSW using data from the Australian Health Survey 2011/12, and evidence statements from the Australian Dietary Guidelines 2013 (NHMRC). Results were presented from a rapid literature review conducted by the University of Sydney's Physical Activity, Nutrition and Obesity Research Group (PANORG), focusing on sugar and health outcomes.


There appears to be strong evidence of adverse effects on body weight from consuming SSBs, and sufficient evidence to recommend reducing energy dense, nutrient poor (EDNP) food sources with more than 50 per cent of total and added sugars. To substantiate sugar consumption intake data from the Australian food supply, further analysis of dietary data from the Australian Health Survey, and Health Star Rating (HSR) system will be included in the review process. Ms Cobcroft concluded that future health campaigns would

promote reducing consumption of EDNP foods and increasing water intake to replace SSBs, as well as completing a review on utilising the HSR system to support policy implementation.

Ms Sarah Hyland, general manager of commercial services at AIFST (on behalf of Colmar Brunton), presented on consumer attitudes, behaviours and trends, noting that while obesity rates have been increasing globally over time, there is no evidence linking any specific nutrient or food to addictive behaviour. In a French study, participants with high sweet taste preferences were less likely to become obese and were more likely to consume natural sources of sugar. Ms Hyland explained that the spectrum of sugar control ranges from low to high level. Low level acknowledges that sugar is related to weight and reducing intake is good. The middle level, comprised of mostly women, are concerned primarily for children and believe sugar is addictive. They also believe that it may lead to other health problems, and tend to limit fruit and use 'healthier sweeteners'. At the high level, people tend to follow celebrity influencers and may avoid all sugar sources, including fruit.

Ms Hyland concluded that consumers report being confused

and many would like to reduce their sugar intake with proper guidance.

Ms Caitlin Reid, dietitian and editor of Health and the City, presented on what dietitians and consumers need to know when it comes to sugar. She explained that consumers turn to celebrities and food bloggers for nutrition and wellness advice, as the messages are relatable and easily understood. Ms Reid proposed that credibility of dietitians has over time declined, due to their association with food companies and that raising awareness of the role of dietitians in the food industry will help increase consumer trust. Ms Reid said consumers need to understand that apart from sugar, foods may contain other nutrients such as fat and salt, while also being educated on the fact, that sugar has a number of technical roles in foods, for example enhancing flavour, preservation, fermentation, colour, gelling and increasing softness. She concluded that portion size is key and added sugar can be enjoyed when eaten in moderation and mindfully. 

Ms Cinthya Wibisono and Ms Rhoda Ndanuko are PhD Candidates at the School of Medicine at the University of Wollongong, New South Wales.



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Andreas Klieber

With a PhD in food science and technology, Dr Klieber has worked across several areas of the food industry throughout his career. He lectured and undertook further research for 13 years in horticulture and food technology with the Universities of Queensland and Adelaide, and has held technical management positions in major supermarkets including Marks & Spencer in the UK and Coles in Australia.

With a passion for delivering better quality products and helping manufacturers improve and protect their competitive advantage, Dr Klieber now leads the team at Quality Associates Training to deliver relevant training to the food manufacturing and retail sectors.



Q What do agrifood businesses stand to gain from investing in vocational training?

A The food industry is constantly evolving with new requirements from retailers, updates to food legislation and new issues developing. It's important people stay on top of these changes. Scrutiny around allergen management, for example, in recent years forced the food industry and those who work in it to adapt their systems to ensure consumer safety.

Vocational training also allows workers to grow into new roles, develop their careers and find personal satisfaction in their jobs. From an employer point of view, a skilled workforce reduces the rate of issues that occur, and minimises

re-work and potentially costly situations such as recalls.

Q As a whole, is Australia good at keeping up with professional training?

A The Australian food industry has been engaged in training and professional development for a considerable time. However, as an industry, the momentum of training needs to be maintained.

With manufacturers seeking greater efficiencies, it is important to consider that training will in fact assist in gaining these. Whether it is through in-house training for specific processes or systems, or participating in publicly available courses, having a professional training provider ensures the best

possible outcomes. This is particularly the case now, as the focus of training has shifted to ensuring participants remain competent and therefore readily useful to the worksite.

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Q The National Centre for Vocational Education Research listed advanced production techniques, risk management and adapting to changing food business requirements as high priority areas. Do you agree?

A I agree with their assessment, as these areas are essential for food manufacturers to stay competitive and develop new markets. To compete on a global scale, we need to keep adapting to new consumer trends and at the same time maintain our reputation for being safe.

Food safety is the major area. This field keeps evolving and now also includes considerations such as food security. Keeping up to date with standard requirements, for example with personal hygiene or improved high care area management, new ways of risk management and thinking in HACCP application, new processing techniques and international trends is crucial. However, food safety systems are only effective if they are well maintained and therefore effective internal auditing is also essential.

Q How do you know if you need training and development?

A Everyone employed in the food industry needs continued development and to update their skills to stay relevant. The requirement for continued professional development is well recognised. For example, the Australian Institute for Food Science and Technology (AIFST) suggests that members participate in the Continuing Professional Development (CPD) program.

It is the responsibility of food businesses to have competent workers and manage safe food practices. Therefore, each staff member should have a well-developed induction and access to continued development opportunities. This should be mapped out for entry-level positions and increasingly self-managed by more professional roles, such as quality and technical managers.

Q What advice would you give to workers in the food industry who want to up-skill or stay up to date with developments but are not sure how?

A As a starting point, talk to trusted colleagues to find out about their role and skill requirements if you want to up-skill. Also, training providers such as Quality Associates Training can assess the training needs for individuals and businesses.

Information on training and training providers is widely available on the internet and in publications such as *food australia*. When selecting the right course and provider, focus on their experience in the industry, exposure to international and retail trends, as well as manufacturing experience. Courses should focus on commerciality and practicality, as well as quality outcomes. Training requires an investment in time and resources, so make sure you get the most out of it. 📍

Dr Andreas Klieber is chief executive officer of Quality Associates Training, a registered training provider focused on tailored in-house and nationally recognised food industry training. For further information, visit qualityassociates.com.au/training.



AUSTRALIA & NEW ZEALAND 2016

January 27-29 AIFST Food Science Summer School. Charles Sturt University, Wagga Wagga, NSW. www.aifst.asn.au

January 28 Australian 2016 International Year of Pulses Launch Dinner, Melbourne Museum www.glnc.org.au/iyp/

February 16-18 The Australian Dairy Conference. Shepparton, Vic. www.australiandairyconference.com.au

March 4-13 Melbourne Food & Wine Festival. Melbourne, Vic. www.melbournefoodandwine.com.au

March 17-18 2nd Asia Australia Food Innovations Conference. Parmelia Hilton Hotel, Perth, WA. www.aafic.net

April 8-10 The Food Show. Horncastle Arena, Christchurch, New Zealand. www.foodshow.co.nz

April 30-May 1 2016 6th International Conference on the Science of Nutrition in Medicine and Healthcare. Sofitel Sydney Wentworth, Sydney, NSW. www.nutritionmedicine.org.au

May 1-3 The Food Show. Horncastle Arena, Christchurch, New Zealand. www.foodshow.co.nz

June 27-28 49th Annual AIFST Convention. Brisbane Convention & Exhibition Centre, Brisbane, Qld. www.aifst.asn.au/convention

INTERNATIONAL 2015/2016

January 7-8 18th International Conference on Global Food Security. River View Hotel, Singapore. www.waset.org

January 22-27 2016 ILSI Annual Meeting. St Petersburg, Florida, USA. www.ilsa.org

February 29-March 3 The Consumer Goods Forum – Global Food Safety Conference. Berlin, Germany. www.tcgffoodsafety.com

March 2-4 Food Vision. Cannes, France. www.foodvisionevent.com

July 6-8 Global Food Security and Sustainability Conference. Beijing, China. foodsecurity.conferenceseries.com

July 16-19 Institute of Food Technologists Annual Meeting. Chicago, Illinois, USA www.ift.org



LIQUID NITROGEN, BERRY COOL!

In an Australian first, liquid nitrogen technology will see an abundance of Australian-grown frozen berries from Tasmania throughout supermarket freezers.

In a groundbreaking first, Tasmanian berry producer, Westerway Raspberry Farm is teaming up with Coles to place Australian-grown berries in supermarket freezers across the country.

Westerway was granted \$260,000 from the Coles Nurture Fund, an initiative established from the supermarket to assist Australian food and grocery producers, farmers and manufacturers to innovate and grow their business.

The Fund will allocate \$50 million over five years in grants and interest-free loans to fund the development of new market-leading products, technologies, systems and processes.

Westerway, which grows raspberries, blackcurrants, blueberries and strawberries in Tasmania's Derwent Valley and supplies them to companies such as SPC, Cascade and Connoisseur, will use the grant to purchase an Individually Quick Frozen (IQF) freezer tunnel, in order to supply locally grown frozen berries to customers on a large scale.

"We've been supplying Coles indirectly for the past 20 years but this will be the first time we have had a direct relationship," said Westerway owner, Richard Clark.

After seeing the freezer tunnel being used on frozen berries first hand in the United States, Mr Clark knew this was the technology he needed to be able to freeze his berries at the peak of their summer freshness to supply Australian customers all year round.

"Liquid nitrogen is the thoroughbred of freezer technology and it only takes a couple of minutes to freeze the fruit in full. The freezer tunnel freezes the water in the cells of the berry very quickly, resulting in non-damaged fruit.


"This means that when the berry is thawed out, the fruit does not tend to leak as they generally do. Our high-quality berries will also retain their shape, texture and flavour when thawed."

Mr Clark said liquid nitrogen has been used in fruit for many years internationally.

The freezer tunnel was installed on the farm in November and will see a range of frozen berries hit supermarket stores from 2016 on.

Premier of Tasmania, Will Hodgman, said that supplying Coles would create jobs and was a massive vote of confidence in Tasmania's agricultural sector.

"The Government is working hard to achieve our goal of growing the value of the agricultural sector to \$10 billion per year by 2050," said Premier Hodgman.

"It is innovators like Westerway who will help us reach that ambitious target." 





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