

food australia

Official publication of AIFST Inc

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AUGUST/SEPTEMBER 2014

Food Futures

Grow your company,
grow your people



Also Inside
DIETARY FIBRE AND GUT HEALTH
AUSSIE INGENUITY IN THE FOOD SECTOR
3D SOLUTIONS IN THE BEVERAGE INDUSTRY

ON THE COVER



"FIAL is proud to thank the 500-plus members of the Australian food and beverage industry, including agricultural inputs, who have participated

in consultations, surveys and pilot workshops, supporting the development of Food Futures. With the help of Catalyst and our industry partners, we have created a sustainable program to support our industry in the longer term," said Dr Mirjana Prica, managing director of Food Innovation Australia Ltd (FIAL).

Food Futures is for entrepreneurial-minded people and businesses, enabling them to find their next consumer, their next customer and their next new product (especially for export).

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Food Futures – Innovation (Leadership for Innovation) is a three-day program being delivered across all states in October and November 2014, with day three being held in February 2015.

Partners

FIAL is proud to deliver Food Futures with national partners including Produce Marketing Association ANZ, Business Foundations WA, CSIRO, Agrifood Skills and Food SA.

ACT NOW! Scholarships for individuals and subsidies for companies are available for participation in Food Futures 2014. Register your interest at www.catalystconnect.com.au/fial-foodfutures



FIAL is committed to the success of the Australian food and beverage industry, including agricultural inputs through delivery of information, connection and tools across the entire national value chain.

www.fial.com.au

Catalyst IRP Pty Ltd is an initiative that evolved as a result of many years of work by Hargraves Institute together with some of its members past and present, including Coca-Cola Amatil, Nestlé, SPC, Cerebos, George Weston Foods, CHEP and Mars Foods. Catalyst's partners include UTS Business School, Queensland University of Technology, Innovation and Business Skills Australia (IBSA).

www.catalystconnect.com.au

Established in 2006, Hargraves is a membership collaborative – a trust-based hub where you can connect with real people who are practising innovation every day, and sharing insights to help you constantly refresh your innovation knowledge. We believe that every working Australian, given motivation, opportunity and ability, can innovate for the success of their organisation.

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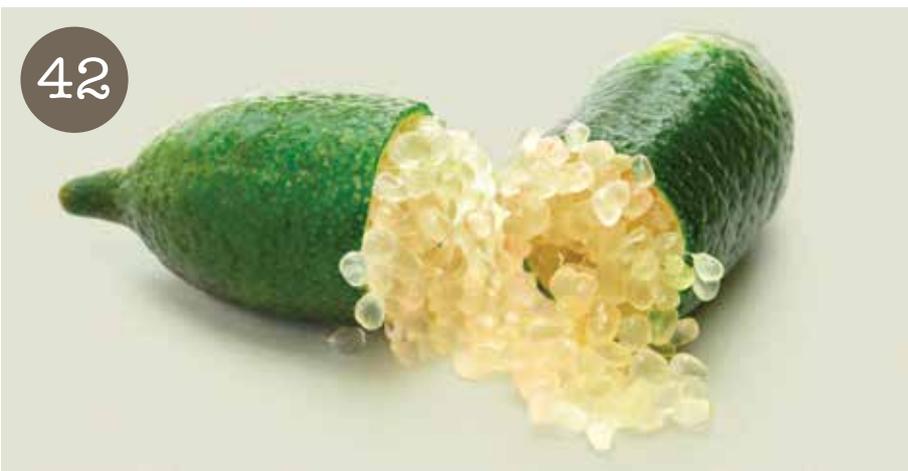
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Published by Australian Institute of Food Science and Technology Incorporated.

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

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

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

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FROM THE PRESIDENT

Welcome to the August/September issue of *food australia*.

This is our first journal since the annual convention, which I am pleased to say was a fantastic success again. I would like to acknowledge the great work of our organising committees led by convention chair **Joe Cardamone** and deputy chair and scientific program lead **Geoffrey Smithers**, along with the tireless work of National Office, led by **Mel Malloch**.

Nearly 600 delegates joined us in Melbourne for three days of presentations, workshops and social events. One of the highlights was an industry leaders' roundtable discussion on the feasibility of Australia's transition from mining boom to dining boom. It was a really interesting and thought-provoking session, which you can read more about in the convention round-up on page 14.

Upcoming issues of *food australia* will feature contributions from key presenters and award winners, starting on page 34 with the emerging story of fibre and gut health by Dr Jane Muir and Professor Peter Gibson, and the Q&A with Jason Hincks, CEO of Foodbank Australia on page 32.

I also encourage you to read the Council Update on page 13. As you are aware, we are undertaking a strategic review to ensure the Institute continues to serve your needs in the evolving food and communications landscape.

As part of this we are holding member briefings in each state throughout August. You will have received an email letting you know the dates – the first was on 6 August in the ACT and the others will be taking place in the coming weeks. I encourage you to attend and share your views.

And in the meantime, happy reading.

Dr Anne Astin

AIFST President



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1 October 2012 – 30 September 2013 – 2700
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BY THE NUMBERS

AUSTRALIA'S BIGGEST HORTICULTURAL EXPORT

Tree nuts are Australia's largest horticultural export sector with current foreign earnings exceeding \$A650 million and forecast to exceed \$A1.1 billion by 2025.

The new Australian forecast figures were presented to the global nut industry at the 33rd World Nuts and Dried Fruit Congress, recently held in Melbourne.

According to congress chair and Australian nut grower Michael Waring, while Australia has proven itself as a viable producer known for quality, we are still small in relation to world supply.

"Currently Australia produces just two per cent of world farmgate value of nuts, so there is huge potential. Our competitive advantages are our proximity to South-east Asia and our reputation of being a premium producer. We're off-season to the US and we have a solid track record of successfully supplying sophisticated markets in Europe, US and Japan, which recognise quality and a secure supply chain."

Back home, the Australian tree nut market has grown by four per cent year on year for the past 10 years, driven by health-conscious consumers incorporating nuts as a staple, and the greater use of nuts as an ingredient.

"Twenty years ago, the obsession with low-fat diets was a disadvantage to the nut industry. Years of scientific research, such as trials like the PREDIMED study, have emphasised the value of good fats and helped people to understand that eating foods rich in good fats as part of a healthy balanced diet does not cause weight gain. This means nuts are now seen as a functional, tasty and healthy addition to food products.

"Use of nuts as a core ingredient in product development is definitely a key industry trend. Europe has a flourishing ingredient section and Japan is exploring new uses for macadamias in baked goods. And locally, we have seen a significant increase in enquiry from Australian manufacturers."

"This is certainly an exciting time for the industry," said Waring.



Australian production of tree nuts has more than doubled in the past 8 years. The Australian tree nuts industry currently has a farmgate value of \$767 million and is forecast to reach \$1 billion by 2020.

Tree nut production in Australia is dominated in scale by almonds, representing more than 50% of the total area planted and the tonnage produced.



Tree nuts are Australia's largest horticulture export industry with exports exceeding \$A650 million.



The macadamia, Australia's iconic native species, is the country's second largest tree nut industry, accounting for approximately 34% of area planted and 30% of tonnage produced.



The Australian macadamia industry spends around \$2 million in research and development each year.

The tree nuts industry is forecast to exceed A\$1.1 billion by 2025.



The Australian market has grown by 4 per cent year on year for the past 10 years.



The tree nut industry employs around 5,000 people throughout regional Australia with more than 15 million nut trees planted around the country.



Source: The Australian Tree Nut Industry, Growing for Success 2014.



GM BANANA ENTERS HUMAN TRIALS

The announcement of the world's first human trial of pro-vitamin A-enriched banana is being met with optimism for its potential to lift the health of millions of East Africans.

One of the most significant biofortification projects in the world today, the Queensland University of Technology (QUT) initiative has been running since 2005 and is being led by Distinguished Professor James Dale with nearly \$10 million in backing from the Bill & Melinda Gates Foundation.

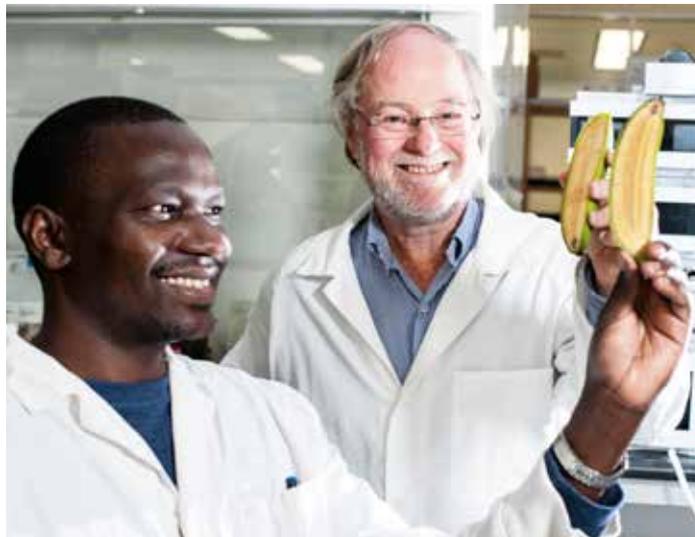
"Human trial is a significant milestone for this project, which should see pro-vitamin A-enriched banana varieties being grown by Ugandan farmers by 2020," Professor Dale said.

According to the World Health Organization, vitamin A deficiency is the leading cause of preventable blindness in children and increases the risk of disease and death from severe infections.

"The consequences of vitamin A deficiency are dire, with up to 700,000 children worldwide dying each year and at least another 300,000 going blind.

The Highland or East African cooking banana is a staple food of many East African nations but it has low levels of micronutrients, particularly pro-vitamin A and iron.

"We are aiming to increase the level of pro-vitamin A to a minimum of 20 micrograms per gram dry weight," said



Ugandan PhD student Stephen Buah with Professor James Dale, director of Centre for Tropical Crops and Biocommodities at QUT.

Professor Dale. Before field trials in Uganda began, initial laboratory tests were performed at QUT in Brisbane and field trials were conducted in far-north Queensland.

"We made all the constructs, the genes that went into bananas, and put them into bananas here at QUT. Now the really high-performing genes have been taken to Uganda for the field trials."

"This is an example of where good science can make a massive difference to the lives of poor and subsistence-farming populations," said Professor Dale.

ROBOTICS REVOLUTIONISING AUSSIE VEGIE FARMING

University of Sydney robotics expert Professor Salah Sukkarieh has been awarded Researcher of the Year by the Australian Vegetable Industry's peak body, Ausveg, for his work on intelligent farm robots.

Professor Sukkarieh's research team aims to redefine key areas of field robotics such as sensory technology, materials development and complex autonomous mechanisms.

He said the automation of on-farm processes is poised to play a decisive role in minimising input and maximising output of future agriculture. Automation can help to increase efficiency and yield, by having many of the manual tasks of farming performed by specially designed agricultural robotic devices.

Professor Sukkarieh's award particularly acknowledged the Ladybird, a ground robot with supporting intelligent software.

"Ladybird focuses on broad acre agriculture and is solar-electric powered. It has an array of sensors for detecting vegetable growth and pest species, either plant or animal. She also has a robotic arm for the purposes of removing weeds as well as the potential for autonomous harvesting," said Professor Sukkarieh.

According to Professor Sukkarieh, the Ladybird's first field trip recently conducted in Cowra, NSW, was a success.

"The robot was able to autonomously navigate within rows and from one row to the next, while gathering sensor data. Sensors include lasers, cameras and hyper spectral cameras."

Future testing of the Ladybird will include a robot manipulator arm located under the vehicle that has potential for spot sensing or spot sampling and looking towards automated harvesting.

WILD RICE COULD SOLVE GLOBAL HUNGER



Australia's wild rice could be the key to global food security, according to the University of Queensland's leading plant geneticist.

In research led by Professor Robert Henry from UQ's Queensland Alliance for Agriculture and Food Innovation (QAAFI), scientists have identified gaps they call 'genome deserts' in the inherited components or DNA of Australian wild rice.

Professor Henry said the gaps were evidence of one or more major selection events that occurred naturally in pre-historic times, well before domestication.

"Rice has been domesticated for several thousand years," he said.

"Australian wild rice, which also has important similarities with domesticated rice, has been isolated from the impacts of domestication in Asia, so its genes still carry huge variation in many parts of the genome.

"Natural selection in the wild was not due to humans.

"Australian wild rice has enormous diversity but we can still see evidence of a major selection event happening, pre-domestication, probably millions of years ago."

"The Australian wild populations represent an invaluable source of diversity supporting rice food security," he said.

Professor Henry said rice was one of the world's most important food crops and if it were compromised, the ancient DNA found in Australian wild rice would be crucial to the industry's defence.

"Australian wild rice could play a major role in future worldwide breeding programs that would improve disease and pest tolerance, reduce fertiliser needs, grow healthier crops and enhance food security," he said.



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POULTRY GROWERS BAND TOGETHER

The Australian Competition and Consumer Commission (ACCC) has authorised members of the NSW Farmers' Association who grow chicken, turkey and duck meat, to collectively bargain with processors.

Under the collective bargaining arrangements, poultry growers will form common interest 'grower groups' to collectively bargain the terms and conditions of contracts with the relevant poultry processor.

Currently there are five chicken and turkey processors in New South Wales – Inghams Enterprises, Baiada Poultry, Red Lea Chickens, Cordina Chicken Farms, Summertime Chicken, and one duck processor, Pepe's Ducks.

Under existing NSW legislation, chicken and turkey growers can collectively bargain with processors however with ACCC authorisation, they can continue working together if the NSW legislation is removed, and also include duck growers as part of the collective bargaining group.

"Collective bargaining allows poultry growers to share transaction costs, such as employing expert advisors, which can improve their input into contracts," ACCC deputy chair Dr Michael Schaper said.



"The arrangement may lead to more efficient contracts, which better reflect the circumstances of the growers and processor."

The ACCC authorisation lasts for 10 years and provides immunity from court action for conduct that might otherwise raise concerns under the competition provisions of the *Competition and Consumer Act 2010*. Broadly, the ACCC may grant authorisation when it is satisfied that the public benefit from the conduct outweighs any public detriment.

SUPER WHEAT



The development of drought and heat-tolerant wheat could be closer than first thought thanks to a new funding grant from the Australian Research Council (ARC) and grain industry partners.

The Australian Centre for Plant Functional Genomics (ACPGF) was awarded the grant to continue its specialised research into the genomics of Australian wheat breeding, and develop a product more capable of surviving Australia's harsh weather conditions.

Not only will the wheat be hardier, the ACPFG said it will produce greater yield without compromising on quality, and together with researchers from the University of Adelaide and wheat breeding companies, the grant will help develop breeding programs for a diverse range of wheat as well as sophisticated field-based screening technology that selects the best breeding lines.

"Wheat is Australia's most important crop but is challenged by our harsh and variable climate," said co-chief executive of the ACPFG, Associate Professor Sigrid Heuer.

"Rates of genetic gain have slowed over the past decade, but by utilising recent advances in wheat genomics and our expanding knowledge of the genetic control of drought and heat stress tolerance, the project will deliver expanded germplasm resources and technological advances to plant breeders."

The development of the hardy wheat type could revolutionise wheat production in Australia, with the Grains Research and Development Cooperation, Australian Grain Technologies, Intergrain, and Longreach Plant Breeders all supporting the research.

"This is a wonderful opportunity to work with the Australian grains industry in a really important area," said ACPFG co-chief executive Michael Gilbert.

"The Grains Research and Development Corporation and the Australian Research Council have always been strong supporters of our work, and this is further evidence of the great applied science we have here at the ACPFG."

PARASITES IN FIRING LINE



A list of the top 10 worst food-borne parasites has been released by the UN's Food and Agriculture Organization (FAO) and the World Health Organization (WHO).

Among those with the greatest global impact are pork tapeworm (*taenia solium*), which topped the list, protozoa in meat, fresh produce, fruit juice and dairy, and flatworms (*opisthorchiidae*) in freshwater fish.

Food-borne parasites affect the health of millions of people each year, causing muscle and organ infection, epilepsy, anaphylactic shock, amoebic dysentery and a range of other problems, yet little is known about where these parasites come from, how they live in the human body and why they make us sick.

As a result of the FAO-WHO report, *Multicriteria-based ranking for risk management of food-borne parasites*, work is now underway to develop guidelines to help countries control the presence of these parasites in the food chain.

Renata Clarke, head of food safety and quality at FAO said the list is a good starting point for tackling the parasite problem at a global level.

"Obviously this top ten is a more general, global perspective and does not necessarily reflect parasite rankings at a national level where each country may have more precise information," she said.

"But considering the problems they cause, these parasites do not get the attention they deserve. We hope that by releasing a top ten ranking we can increase awareness among policy makers, the media and the general public about this major public health issue."

THE TOP 10 FOOD-BORNE PARASITES ARE:

1. *Taenia solium* (pork tapeworm): In pork
2. *Echinococcus granulosus* (hydatid worm or dog tapeworm): In fresh produce
3. *Echinococcus multilocularis* (a type of tapeworm): In fresh produce
4. *Toxoplasma gondii* (protozoa): In meat from small ruminants, pork, beef, game meat (red meat and organs)
5. *Cryptosporidium spp.* (protozoa): In fresh produce, fruit juice, milk
6. *Entamoeba histolytica* (protozoa): In fresh produce
7. *Trichinella spiralis* (pork worm): In pork
8. *Opisthorchiidae* (family of flatworms): In freshwater fish
9. *Ascaris spp.* (small intestinal roundworms): In fresh produce
10. *Trypanosoma cruzi* (protozoa): In fruit juices.

Source: FAO-WHO (2014). *Multicriteria-based ranking for risk management of food-borne parasites*.

DEVONDALE REVOLUTIONISE MILK PRODUCTION

Australia's largest dairy food company Devondale Murray Goulburn has opened its \$80 million state-of-the-art milk processing plant in Melbourne, in what is touted as the most important dairy asset built in Australia in more than 15 years.

The North Laverton facility will be the base for Devondale's daily pasteurised milk brand and the groundbreaking 10-year agreement to supply more than 400 Coles stores with chilled milk for the retailer's private labels.

The announcement is part of a broader \$500 million investment strategy by Australia's largest dairy exporter to rejuvenate its manufacturing and supply chain infrastructure in nutritional powders, cheese and liquid milk over the next three to five years.

Devondale Murray Goulburn's managing director Gary Helou said the plant will position the company to be able to step up its milk production and sales.

"The new site utilises world-leading technology and quality standards that will assist in positioning Devondale Murray Goulburn as the nation's most efficient producer of daily pasteurised milk – a market which currently utilises approximately 20 per cent of total Australian milk production," said Helou.

"Our entry into daily pasteurised liquid milk is a natural strategic step that, supported by a groundbreaking partnership with Coles, will deliver a sustainable increase in the farmgate milk price of Australian dairy farmers."

According to Helou, the new facility features end-to-end automation in-line control, packaging, wet processes, energy services, boilers, refrigeration and trade waste as well as a computerised warehouse management system.

"It has capacity to process up to 50,000 litres of milk per hour and can offload milk from a B-double up to 38 per cent faster than other milk processing plants," he said.



NEW REPORT HIGHLIGHTS LATEST ASIAN FOOD TRENDS

Chinese consumers are increasingly concerned about where their food comes from and what additives or chemicals go into it, according to a recent survey of food trends across the Asia Pacific region.

The Weber Shandwick report revealed that Chinese consumers have a greater interest in their food's origin than consumers in Korea and Singapore, with 84 per cent of Chinese respondents wanting to know where their food comes from, and 86 per cent choosing to eat locally produced food over foreign flavours.

Chinese consumers are also more likely to share their food online and are more influenced by celebrity endorsements of products or restaurants compared to Korea, Singapore and Australia.

According to the report, the increased interest in food from Chinese consumers could be attributed to a number of food safety scares that have rocked the country, as well as concerns over China's environmental footprint.

Meanwhile, Australian consumers are more likely to be influenced by price (70 per cent of respondents) and seasonal food availability (45 per cent) than anything else when it comes to grocery shopping.

And in a somewhat stark contrast to the Chinese consumer's relationship with food, 49 per cent of Australians said they would be less likely to try a product or restaurant endorsed by a celebrity, and only seven per cent of Australians claimed to regularly post about food on social media, compared to almost half of Chinese respondents.

The report suggests Australia's lower level of online engagement and inability to be swayed by celebrity endorsement is a result of media saturation of the food market, with Australians regularly exposed to celebrity chefs and cooking programs on television.

The report, which surveyed 3,250 adults across the four countries, also found a spike in the popularity of Korean food with Singaporeans and Australians, but a resistance to outside food in Korea itself. Only seven per cent of Korean consumers said they regularly opted for foreign flavours, whereas in ethnically diverse Singapore, 87 per cent of consumers said they expected foreign flavours to be regularly available.

The report also looked at the lifestyle factors related to food consumption in the four countries, with more Singaporeans and Koreans reporting to regularly eat on the run due to long working hours, and 22 per cent of Chinese respondents using the internet to purchase their weekly groceries.



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STAR RATING SYSTEM RECEIVES TICK OF APPROVAL

The much anticipated and widely reported Health Star Rating system has been given the green light by Australia's state and territory ministers and will begin appearing on supermarket shelves within 12 months.

But after years of negotiation and compromise between health professionals, consumer groups, government and the food industry, what is the final word on the system touted as one of Australia's biggest ever developments in public health policy? And more importantly, what does it mean for food manufacturers?

The voluntary system, which uses a 1 to 5 star rating to indicate a food's nutritional worth, will be rolled out over five years and will use a calculator designed by Food Standards Australia New Zealand, which relies on nutritional evidence from the 2013 Australian Dietary Guidelines and the federal government's Guide to Healthy Eating.

The Australian Food and Grocery Council (AFGC) is pleased the system offers the flexibility to allow smaller, developing food companies to adopt the system over time but it also supports the retention of existing Daily Intake Guide front-of-pack labelling.



"The improved design of the Health Star Rating scheme, flexibility around its introduction and acknowledgement that it can coexist with existing front-of-pack schemes, such as the Daily Intake Guide and the Heart Foundation Tick, are significant improvements," said AFGC chief executive, Gary Dawson.

"In addition there is acceptance that it can be expensive for cash strapped companies to adopt major labelling changes and therefore a voluntary approach with an extended five-year implementation period has been adopted."

Public health and consumer groups, including Choice, Public Health Association of Australia, Obesity Policy Coalition, Heart Foundation and Cancer Council, have welcomed the move, believing it will incentivise the Australian food industry to produce healthier products and meaningfully contribute to tackling Australia's obesity problem.

But not everyone is happy with the rating system's methodology. The Australian Dairy Industry Council (ADIC) said the system initially didn't consider whole foods but rather focused on particular components like saturated fats, sugars and salt. These concerns have been addressed

but ADIC chair Noel Campbell said the system could confuse consumers on what they need for a well-rounded diet.

"By breaking foods into separate nutrient components, some dairy products may have received fewer stars which would have led to consumer confusion about whether or not they should eat dairy as part of a well-balanced diet," said Campbell.

Dietitian Dr Sarah Elliott, Monash University, said the system makes it too easy for consumers and fails to educate them on the nutritional value and make-up of different foods. She has proposed the continuation of the front-of-pack Daily Intake Guide labelling will combat this.

However, some brand owners, including Sanitarium and Woolworths, have already committed to updating the labelling across their product ranges, while industry group Nuts for Life has predicted a growth in nut consumption as food manufacturers look to fruits, vegetables, nuts and legumes to reformulate their food and boost their star rating.

"As manufacturers reformulate products to increase their star ratings, we anticipate seeing more nuts being used," said Nuts for Life dietitian Lisa Yates.

"This is because they tick the box for the important star boosting section of the algorithm 'the percentage of the food product that contains fruits, vegetables, nuts and legumes (%FVNL)', as well as providing additional nutrients such as vitamins, minerals and antioxidants," she said.



PEOPLE

Australian Grape and Wine Authority appoints Board



The newly formed Australian Grape and Wine Authority (AGWA) has appointed Brian Walsh as its acting chair and also appointed its interim Board, as the new body seeks to establish itself as the authoritative body for Australia’s wine industry.

With 24 years’ experience as chief winemaker, director of production

and director of strategy and business development at Yalumba, as well as 20 years’ experience at McClaren Vale, Brian has a lifetime of experience in the wine industry and is also a current non-executive member of Wine Australia Corporation.

Joining him on the Board are Victorians Eliza Brown and John Forrest. Brown is the CEO of Peter R Brown Family Vineyards and with experience in advertising, sales and marketing is also the first female director of Brown Brothers Wines, while Forrest has experience with grape and dried vine fruit producers through irrigation development.

New South Wales directors include managing director of Casella wines, John Casella, and former Australian News CEO Kim Williams, while Queensland will be represented by Australian Vinegar CEO Ian Henderson.

The new Board is rounded out by South Australian Brian Croser, the former president of the Winemakers’ Federation, who has also contributed to Charles Sturt University’s wine science degree, and Western Australia’s Janice McDonald, who is chief winemaker at Burch Family Wines.

The new authority is a result of years of work by the industry to merge Wine Australia Corporation and the Grape and Wine Research Development Corporation.

CSIRO appoints director for Indonesia



CSIRO has appointed Archie Slamet as the country director for Indonesia as part of its plan to develop international markets. Slamet’s role will be to develop collaborations with Indonesian research institutes and universities, and the private sector across the areas of food and nutrition, agriculture and biosecurity. The role will also

encompass community development in partnership with the Australian Department of Foreign Affairs and Trade, and working to raise the income of poor farmers in East Indonesia.

HACCP award winners to be announced



Winners of the HACCP Conference Awards will be announced in August at the HACCP (Hazard Analysis Critical Control Point) conference dinner. Among the finalists are Damien Alexander, operational food safety manager at Woolworths, and Jo Brooks, director of Australian Dairy Audit Solutions for most outstanding

individual at an agri-food industry company; food safety auditors Lisa Tomassen (SGS) and Anthony Peart (SSCFC, part of QC Australia) for the most outstanding individual working as a registered food safety auditor, and Golden State Foods Australasia, Toll Intermodal and KFC Australia for most outstanding multi-site company for multi-site businesses who have successfully implemented one or more food safety management standards incorporating HACCP. Pirovic Family Farms – Egg Grading and Egg Pasteurising Operation, Tasmanian Dairy Products and Crown Perth are all in the running for the single site award.

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AIFST

UPDATE FROM COUNCIL

The Institute's strategic review is an important step in ensuring we strengthen the skills, knowledge and networks that members need to prosper as part of the Australian food industry.

Words by Dr Anne Astin

The Australian Institute of Food Science and Technology Incorporated (AIFST) has an extremely important role to play in ensuring Australia's food science and technology professionals have the skills, knowledge and networks they need to prosper in a rapidly changing food environment, and this is the key driver for the strategic review currently being undertaken by Council in consultation with the membership.

Membership survey

The first stage of membership feedback for the review process was our member survey conducted in September 2013. It provided a good overview of the priorities of the current membership and identified areas for membership growth.

Key survey findings were:

- People working in R&D, quality assurance, food safety, food product development and technical services are the biggest categories of membership;
- The main areas of interest for members are quality assurance, food safety and product development;
- People join and retain their membership of AIFST for two main reasons – industry contacts and to keep up to date with industry information;
- Around half (52 per cent) of members felt AIFST provided above average or excellent value for their career; and
- In relation to activities currently undertaken by AIFST that could be further expanded, the strongest response was for more networking and knowledge sharing in areas specific to members' work or area of specialty.

Our response

In response to your feedback, we have made some immediate changes, including ramping up the continuing professional development (CPD) program, with thanks to the generous support of the Australian Food and Grocery Council (AFGC).

We have also extended our networks through the strengthening of our relationships with like-minded institutions, including the Institute of Food Technologists, Food Technology Association of Australia, New Zealand Institute of Food Science and Technology, and International Union of Food Science and Technology.

Guided by our Membership Strategy Committee, we will continue improving member value and extending our membership base to ensure that we are providing a strong network across all areas of the Australian food industry.

As part of the strategic review, we are looking at ways our current structure can be improved to facilitate greater interaction in areas of special interest within the membership.

In addition to responding to member feedback, Council is very conscious of the need to strengthen revenue streams to ensure the Institute's ongoing financial viability. As part of this we are looking at partnerships – like those we have established with Food Innovation Australia Limited (FIAL) and the AFGC – as well as increasing our membership base.

Another element we are currently considering is our governance. We have been reviewing our constitution and have found that due to the size and structure of the Institute our current incorporation under the Associations Act may not be the most appropriate way to move forward. In order to address this, Council is considering the implications of a move to incorporation under the *Corporations Act*.

Transitional advisory board

To guide us through these changes, we established a transitional advisory board – which is a sub-set of Council members – and includes myself, Michele Allan, Jo Davey, Tom Debney, Stewart Eddie, Fiona Fleming, Tom Lewis and Allison Vella.

Member briefings

Throughout August we will be holding member briefings in each state to share with you our proposed plans and provide the opportunity for questions and feedback. The first briefing was on 6 August in the ACT and others will be taking place in the coming weeks. Please contact your local branch for the date and location of your state's meeting.

After the member briefings, we will finalise our recommendations, which will be voted on by the membership at an Extraordinary General Meeting to be held in October.

This is an exciting time for AIFST. If you have any questions please don't hesitate to get in contact with me. At the heart of everything we do is our goal to provide benefits to you, our members, and to support you throughout your careers.

CONVENTION ROUND-UP



Rob McConnell on the panel.

The theme of this year's convention, Food – The Final Frontier: Challenges and Opportunities for the 21st Century, set the scene for a fantastic three days of informative and inspiring presentations, workshops and an entertaining social program.

The program included over 100 sessions for delegates to choose from, covering topics as diverse as processing efficiency and effectiveness; diet, health and performance; food reformulation; traceability; allergen risk management and development; food chemistry and safety; supply chain economics; cereal science; and sustainability.

One of the major highlights was a session on the feasibility of Australia's transition from mining boom to dining boom. It was a fantastic opportunity to hear the views of industry leaders, including **Michele Allan**, Meat & Livestock Australia chair, **Maurice Moloney**, group executive of Agribusiness, CSIRO, **Rob McConnell**, national industry leader of Agribusiness, Deloitte, **Peter Schutz**, Food Innovation Australia Limited chair, **Callum Elder**, Simplot's executive director quality & innovation, and dairy farmer **Shirley Harlock**. It was moderated by journalist **Emma Alberici**.

The session started with a presentation from **Rob McConnell**, who challenged the notion that Australia would want to be the food bowl to Asia. His suggestion is that Australia needs to aim to be a delicatessen with premium pricing, and look to Asian markets that will reward that.

This was reinforced as the discussion opened up to the panel with **Peter Schutz** noting that Australia can feasibly produce about one per cent of Asia's requirements and as a result, we need to identify the particular areas where we can specialise and become a niche, value-added player. He commented on exporting to China, saying the notion that any one company could supply product to all of China is unrealistic. We need to focus on individual cities.

The panel discussed critical factors to Australia being in a position to meet some of the Asian demand. **Shirley Harlock** noted the importance of supporting the farm sector by reducing regulatory burden as well as giving the farming community the tools to help them manage risk.

Michele Allan raised some of the impediments to Australia being able to be in a position to meet Asian demand, including



2014 convention chair Joe Cardamone hands over the mascot to 2015 chair Allison Vella and committee member Cathy Moir.

establishing a position on foreign investment to enable us to develop infrastructure, addressing the issue of on-farm returns and securing transparency of regulations in Asian markets.

Simplot's **Callum Elder** believes Australia needs to address the issues of infrastructure, education and deregulation. Currently, universities are not meeting the national need for agronomy, food processing and engineering, and food science and technology courses. And regulatory burden in Australia means that it costs more to get food from the dock to a warehouse than it does to import it from Spain to Australia.

Maurice Moloney commented that our advantage is food safety, reliability of supply, quality and innovation. For instance, the application of science and technology means we can substantially increase primary production through new technologies to improve productivity per hectare for both crops and livestock. But, as the panel agreed, achieving this will need an act of will and investment.

In closing, **Peter Schutz** reinforced that, as an industry, the future is in our hands. Through collaboration and skill, the industry can get in there and solve the issues we are facing.

The *Mining Boom to Dining Boom?* Roundtable was just one of the highlights of the many interesting and stimulating presentations delegates enjoyed over the three days.

The presentation of awards is a very important part of the annual convention. **Bonny Rawson** and **Isabelle Sam-Soon** from Curtin University won the 2014 Student Product Development competition for their **Laceto's** Lemon Myrtle ice-cream.

The 2014 Malcolm Bird Award was presented to Adelaide University's **Laura Blake**, the Bruce Chandler Book Prize was awarded to dietitian **Catherine Saxelby** and the AIFST



Jenny Robertson receives the President's Award.



Delegates at the wine and cheese evening.



Delegates at the convention dinner.

President's award was presented to **Jenny Robertson** and **Connie Restuccia**.

The AIFST Food Industry Innovation Award was presented to **Lupin Foods**, the winner of the Keith Farrer Award of Merit Citation and Address was **Tom Ross**, University of Tasmania and the Jack Kefford award was presented to **Sushil Dhital**.

The social program at the annual convention is always a highlight – and this year was no exception. The wine and cheese night was a real treat, with premium cheeses presented by Lion's head cheese maker, **Ueli Berger**, who carefully selected

wines to match. And the convention dinner culminated in a packed dance floor of 'Trekkies', really bringing to life The Final Frontier aspect of the convention theme.

Finally, the convention mascot was handed over to 2015 chair **Allison Vella** and committee member **Cathy Moir** as the planning for the 48th Annual Convention is now in full swing. For the first time, next year's event will be held in conjunction with the 15th Australian Food Microbiology Conference, chaired by **Nai Tran-Dinh**. The event will be held 11-13 August 2015 at Sydney's Luna Park. We hope to see you all there.

CPD UPDATE

The Continuing Professional Development (CPD) program has some exciting events planned for the second half of 2014.

For people seeking to develop products that meet the specific needs of a market segment, **Foods for Specific Populations** will be held on 17-18 September 2014 at Melbourne Exhibition Centre. The seminar offers an intensive two-day program designed to help you innovate and successfully capitalise on product development opportunities.

The event will focus on the commercial, technical and regulatory challenges of delivering nutrition information and products for specific populations, including those with allergies or intolerances, the elderly, people with diabetes and infants.

Following on from our very successful Innovation Seminars held in Sydney in 2012 and Melbourne in 2013, we have **Innovate to Survive: Reloaded**, which will be held in Sydney at the University of New South Wales from 22-23 October 2014. The two-day intensive seminar will cover knowledge management, online innovation, design thinking process,

innovation models, value chain analysis, collaboration and networking, business models, consumers and market insights and opportunities to access free IP.

Register now via the AIFST website.

The CPD program has been designed to meet the needs of members in their varying roles within the Australian food industry. It has also been designed to offer credits to the Certified Food Scientist (CFS) Credential, which we are now offering in conjunction with the United States Institute of Food Technologists (IFT). If you are yet to register for the CFS Credential visit the AIFST site for more details.

Announcing the launch of the premier on-line Asia Pacific food science journal



FOOD ASIA PACIFIC is a brand new online journal covering the food science industry across the Asia Pacific region produced by the Australian Institute of Food Science and Technology (AIFST) and Food Innovation Australia Ltd (FIAL).

Look out for your first edition on 1st September – available at www.foodasiapacific.com

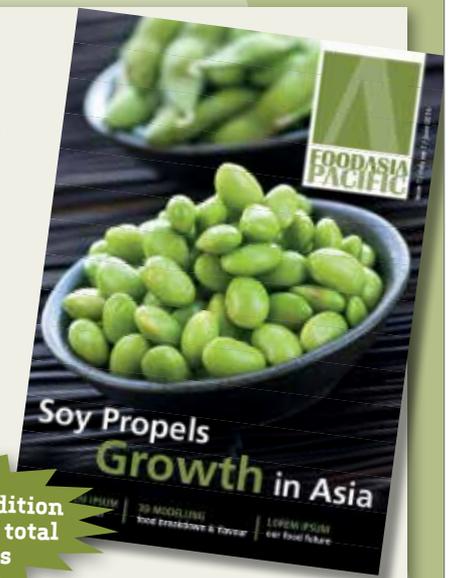
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LEAD 360 REPORT

Words by Rob Porfiri



The LEAD 360 program ran alongside the Institute of Food Technologists (IFT) annual meeting and food expo held in New Orleans last July, and I was fortunate enough to be selected to attend and represent Australia.

Bringing together 20 early-to-mid-career professionals from industry, research and academia from 12 different countries, LEAD 360 is an intensive three-day annual event

aimed to help develop future leaders in the food industry. The program offered many highlights.

Dr Bob Gravani, Professor of food science at Cornell University and past IFT president, led a discussion on leadership and highlighted five key practices of effective leaders – model the way, inspire a shared vision, challenge the process, enable others to act and encourage the heart.

Dr Martin Cole delivered a presentation on the need for the scientific community to develop the skill of storytelling. He looked at the importance of building a global mindset to address the challenges of food security, population health, and biosecurity / food safety. The need to encourage an understanding and appreciation of food science was highlighted as an essential step in addressing these global challenges.

The importance of continued development of emotional intelligence (EQ) was delivered with a presentation by **David Kiviahio** from the Kissa Corporation. This presentation highlighted the value of EQ in the workplace and as a key foundation in leadership.

The Lead 360 group also attended the opening session of the IFT conference presented by **Doug Rauch**, former president of Trader Joe's. Rauch presented on the factors impacting global

food security, and the issue of food waste was highlighted by a study by the Natural Resources and Defence Council that showed as much as 40 per cent of food in the US is never consumed.

Christian Crews of AndSpace Consulting presented on anticipatory foresight, which is systems and processes used for predicting future opportunities, challenges and scenarios.

Suzy Badaracco held a workshop on consumer health behaviours and attitudes. Highlighted was the importance of understanding your target market and the value of analysis and interpretation of the evolution of specific trends, rather than focusing on what competitors are doing.

The team also attended one of the featured sessions of the IFT program by **Dr Diane Ebert-May** from Michigan State University. She challenged the lecture-style delivery of learning and assessment techniques which value memorisation and rote learning versus group based activities, which promote analytical reasoning, development of arguments and communication.

In a self-led team project to promote and support leadership and growth of the food science profession, the 2014 LEAD 360 team came up with the idea of 'The Lighthouse'. It is a collection of stories and profiles to provide guidance and inspiration to early career (0-5 year) professionals. As a team, we are using an online platform provided by the IFT to communicate and share information and have a target of completing the project within 12 months.

The LEAD 360 program was delivered in a way that challenged us, encouraged us to reflect on our own development and focus on the important role the food science community plays in the future of food. The program provided valuable knowledge, strong personal development and helped develop important global networks.

I would like to thank the AIFST, AFGC, IFT and Trisco Foods for supporting the program and providing me with the opportunity to take part. I encourage other early career professionals to apply for the program next year.

australian food map

The food industry's ultimate network

The Australian Institute of Food Science and Technology Incorporated (AIFST) in conjunction with Food Innovation Australia Limited (FIAL) have successfully developed and created an Australian first of a kind interactive food industry map that will officially be launched in September as a free website.

The food industry has always lacked a centralised database! This map will provide the industry with a brand new interactive way of connecting, networking and reaching out to a widened availability of services.

We will showcase the map at Fine Food Australia, 15 – 18 September 2014 at the Melbourne Exhibition Centre, so please visit the AIFST stand HE6 and check it out!



PROTECTING YOUR BUSINESS WITH RELIABLE HYGIENE TESTING

In a marketplace where food-borne illness can make or break your reputation, cleaning and sanitation are critical to protecting your business.

According to the Department of Health, the burden of disease transmitted by contaminated food in Australia is estimated to cost \$1.2 billion each year, most of which is as a result of lost productivity due to people taking time off work as a result of their own illness or to care for someone else who was ill.¹ And this cost doesn't begin to estimate the cost to brand reputation for businesses whose products may be involved.

Aside from public health and brand protection considerations, food safety measures are a regulatory requirement.

In order to ensure the delivery of safe food from your organisation, you need to be following the Hazard Analysis Critical Control Point's (HACCP's) seven principles:

1. Conduct a hazard analysis
2. Identify critical control points
3. Establish critical limits for each critical control point
4. Establish critical control point monitoring requirements
5. Establish corrective actions
6. Establish procedures for ensuring the HACCP system is working as intended
7. Establish record keeping procedures.

Effective environmental hygiene management helps reduce levels of contamination in finished products, leading to improved quality, fewer batch rejections and lower risk of product recall.

According to Rex O'Rourke, 3M Food Safety, good hygiene includes three steps: clean, check and sanitise but unfortunately the 'check' step is often overlooked and that's where the **3M™ Clean-Trace™ Hygiene Monitoring Systems** come in.

"Monitoring the effectiveness of your cleaning and sanitising procedures is crucial to reducing the risk of a food safety incident and it needs to be done regularly. Because microbiological tests have long waiting times, we created a series of fast, simple and reliable testing systems that can easily be incorporated into your HACCP program," said O'Rourke.

3M Clean-Trace Hygiene Monitoring

The **3M™ Clean-Trace™ Hygiene Monitoring Systems** are a range of easy-to-use compact devices and three-step processes to make testing simple.

The **3M™ Clean-Trace™ Protein** tests detect protein and other reducing agents on surfaces indicating the presence of residues. The test can be performed with minimal training



and the results are available within minutes. The tests include a surface allergen test, which is validated for a range of allergenic proteins including egg, milk, gluten, soy and peanut.

The **3M™ Clean-Trace™ ATP** tests help to assess standards of hygiene and cleaning procedures by measuring the amount of adenosine tri-phosphate (ATP) in a sample, providing a fuller picture of the hygienic status of the equipment.

"When combined with our easy-to-use software, **3M Clean-Trace** offers a complete system you can rely on. Our adaptable software provides unprecedented capabilities to track trends, create reports, and identify immediate and long-term issues to protect your business in a competitive global marketplace," said O'Rourke. "It all leads to making the right decisions to protect your brand."

Reference

1. 30 June 2014. The importance of enteric infections in Australia. www.health.gov.au/internet/main/publishing.nsf/Content/cda-cdi3801a.htm

3M is a leader in innovative solutions that help the food and beverage industries optimise the quality and safety of their products to enable consumer protection. At every step, 3M Food Safety provides solutions that help mitigate risk, improve operational efficiencies and impact the bottom line.

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FRONT OF PACK LABELLING – NEXT CHAPTER IN THE SAGA?

The new front-of-pack labelling scheme represents a bold experiment in public policy intervention

Words by *Geoffrey Annison*

Those of you with long memories will recall that for more than a decade, front-of-pack [nutrition] labelling (FoPL) has been debated. The primary driver has, of course, been providing better, more accessible information to consumers at point of sale, to help combat the rising levels of non-communicable disease.

In Australia, the first calls for FoPL followed the introduction of mandatory Nutrition Information Panels (NIP) as part of the new Australia New Zealand Food Standards Code which was gazetted at the end of 2001. In contrast, however, to the *informative* style of the NIP, the public health sector advocated the introduction of an *interpretive* FoPL scheme with the favoured format being multiple “traffic light labelling”.

The Australian Food and Grocery Council (AFGC) responded by introducing the Daily Intake Guide (DIG) front-of-pack scheme in 2006 which is now on over 7000 products across all major categories. The AFGC argued that the DIG essentially reflected the NIP, but in a more accessible format. Subsequently, a divisive public policy debate ensued, often played out in the mainstream media. Industry criticised traffic light labelling as inappropriately promoting a good food/bad food dogma, thereby undermining conventional nutritional wisdom and the good diet/bad diet concept.

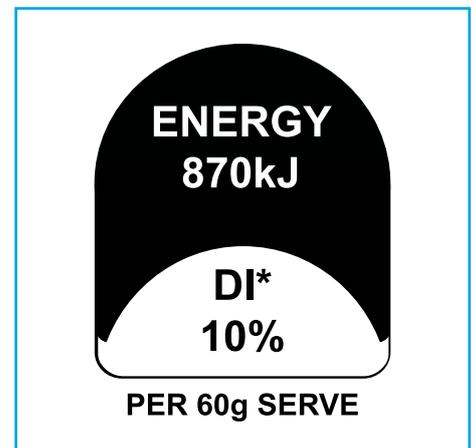
In turn, the DIG was criticised as being difficult for consumers to understand, although studies showed that consumers were able to use it effectively¹.

In 2011, the Council of Australian Governments’ review of food labelling recommended that a voluntary traffic light scheme be introduced, but this proposal was rejected by the Commonwealth. The Australian New Zealand Food Regulation Ministerial Council, forerunner to the current Legislative and Governance Forum on Food Regulation (FoFR), then convened a large group of stakeholders comprising industry, public health advocates, consumer representatives and government and requested that they jointly develop a national FoPL scheme that built on existing labelling and included an interpretive element.

Thus, a bold experiment in public policy intervention began. It was the first time such a broad representation of interests was brought together to address a tightly defined and highly contested public health and regulatory policy issue. Space does not permit a detailed description of the process but it culminated on 27 June 2014 when the FoFR agreed to the introduction of a new *voluntary* FoPL scheme for packaged food³.

The scheme comprises:

1. An *interpretive* Health Star Rating (HSR) label showing 1-5 stars (with ½ star increments) with the number of stars based on the food’s nutrient profile; and
 2. An *informative* nutrition label indicating the level of energy and selected nutrients.
- Information on the new FoPL scheme



is available from the Department of Health. It is anticipated that the new FoPL scheme will be supported by a social marketing campaign but details on the content, media channels and timing have yet to be determined.

Food companies are, of course, in the best position to determine the potential value of the new HSR FoPL scheme in assisting the food choices of their consumers. It may be used standalone, or in conjunction with the DIG and other health marks such as the National Heart Foundation Tick and the Glycemic Index Symbol or more general nutrition and health claims.

The AFGC considers the interpretive HSR labelling is best considered as an adjunct to the informative DIG labelling. The DIG labelling scheme is well established and has been designed to provide nutrient content and percentages of advised daily intakes of nutrients on a consistent **per serve** basis.

This allows direct comparison between products as presented to consumers. Central to the DIG scheme is the *energy* label – also referred to as the *energy icon* or *thumbnail*. Encouraging consumers to monitor and moderate their energy intake (i.e. eat less) will concurrently moderate their intake of risk associated nutrients such as saturated fat and sodium. For this reason, the AFGC considers that the minimum companies should consider (for example if label space is tight) is the energy icon.

It is not possible at this stage to predict how successful the HSR FoPL scheme will be. The challenge of helping consumers to select a healthy diet to help reduce the levels of non-communicable disease is substantial. If enough food products carry the HSR labels, and enough consumers take note of it and change their food choice it may result in an improved nutritional status, and health, of at least some population groups. On the other hand, simplifying some nutritional science into a single labelling device may be too simplistic, leading to comparisons that seem at odds with common understanding of the relative nutritional value of food products. FoFR has acknowledged that anomalies have been identified in some of the star rating scores of some food products.

And against the backdrop of other strong drivers (price, taste, convenience, brand loyalty etc), it is simply not known how much notice consumers will take of the star rating score in making their food choices. FoFR has signalled that the HSR will be implemented over five years. Its success, or otherwise, will be judged then.

Thus, the long-running saga of front-of-pack labelling continues. The AFGC will continue to support the DIG as

a well-accepted labelling scheme for consumers, consistent internationally with other front-of-pack labelling schemes. The AFGC will also provide guidance to its members and the wider industry as to how best to integrate the HSR scheme with the DIG, should companies wish to go down that path.

As for the bold experiment in public policy? The AFGC, and other industry organisations, have demonstrated a willingness and capacity to work hand in hand with other stakeholders towards the objective of helping Australians to healthy lifestyles. The outcome is entirely aligned with industry's preferred approach, but only time will tell whether the compromises made will limit HSR use by industry, and usefulness to consumers. ^A

Reference

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4. www.ahmac.gov.au

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

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AUSSIE INNOVATION ALIVE AND KICKING

According to IP Australia's latest report, Australian food growers are among the best in the world when it comes to developing new products and processes.

Words by Barry McGookin

Aussie ingenuity is alive and kicking across the food sector according to IP Australia's latest report, which indicates Australian food growers are among the best in the world when it comes to developing new products and processes.

Our industry scored a positive technologxxxx

Barry McGookin is the general manager, innovation, skills and development at Food Innovation Australia Limited.

Food Inventions by State

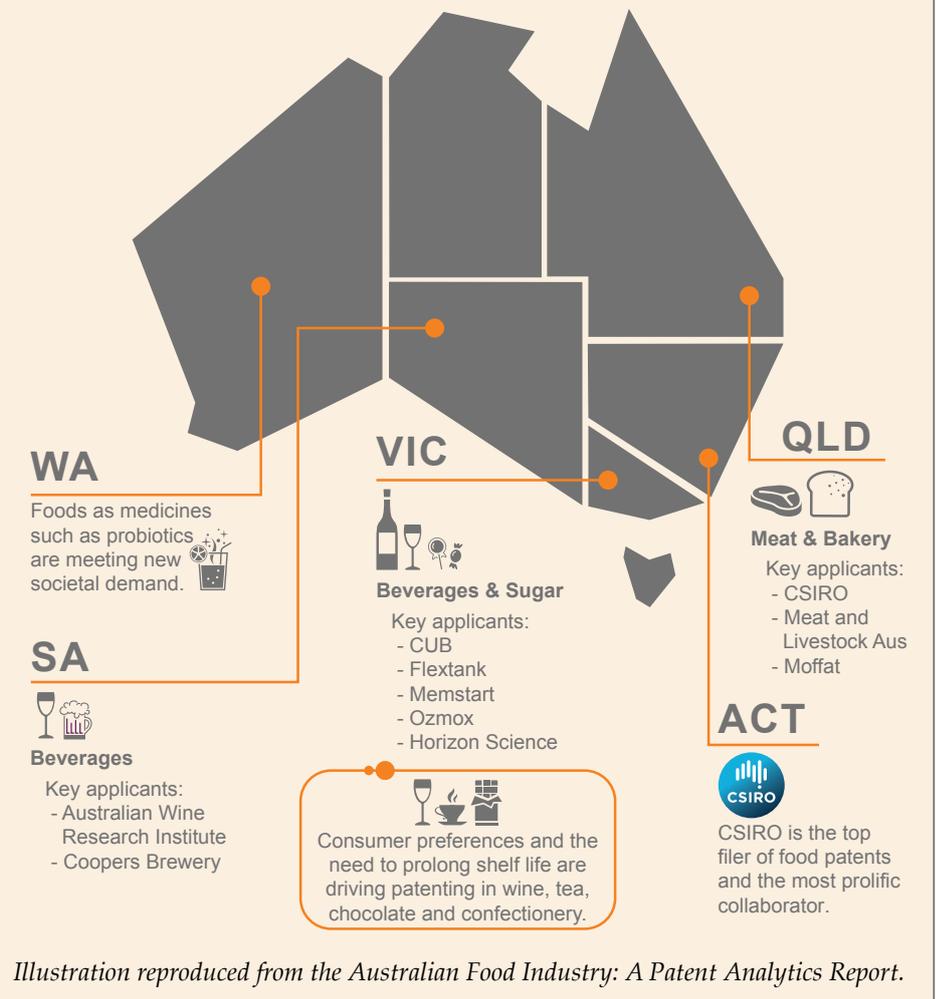


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Food Inventions in Australia

70%
of patents
are filed
by corporations



Australia
is ranked
14th
globally



80%
of inventors
live in
capital cities

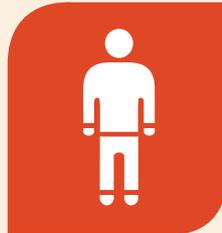


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WHEN DAVID MET POLLY

Sustainable food production's future lies both in the field and the lab. For more than 50 years, Australian scientists David and Polly MacLennan have been leading the way.

When David MacLennan met Mary De zouche Hall, otherwise known as Polly, the sum was greater than their two parts.

The year was 1961, Robert Menzies was Prime Minister, the oral contraceptive pill went on the market, and the international space program was in full swing. David was a 25-year-old biochemist fresh out of university in Sydney, and excited to start his first job in the research department of renowned biopharmaceutical company, Commonwealth Serum Laboratories in Melbourne.

Polly was a 25-year old English girl who said goodbye to her family, after completing university in Reading, and moved to Melbourne to take up work as a scientist at Commonwealth Serum Laboratories. She hadn't been there long when the new recruits, among them David, arrived in the labs from Sydney.

"I had been warned about these guys who were coming down from Sydney, particularly not to believe a word they said," laughs Polly, now 78.

But there was something about David. As the two worked together, a respect for one another developed, and with that, the realisation they made a pretty good team.

"I courted Polly in the laboratory," laughs David.

"She taught me large areas of microbiology which I didn't know, and I taught her quite a lot of micro physiology which she didn't know. We found we worked very well together, so we got married and then moved to England."

And just like that, the brains that would help transform the food industry's approach to sustainable food



production were united. More than 50 years later, the pair is responsible for more than 25 patents and publications, has founded nine research and development companies across Australia, and now, both well into their seventies, continue to work in the lab for their 29-year-old food innovation venture, Agritechnology.

The pair put their entrepreneurial spirit and passionate pursuit of innovative food solutions down to their time in England, where David worked as a biochemist for Imperial Chemical Industries (ICI) Agricultural Division. There he led the research into developing a single cell protein process to produce feed protein from natural gas and methanol for feedstock. The project led to his first patent on the process of producing the feed-grade protein concentrate from methanol.

"It was at a time when there was a perceived world shortage of protein, and there had been a discovery of

natural gas in the North Sea. ICI was working on how we could come up with a solution by converting the natural gas into food and feed," said David.

"It was an unbelievable project to be a part of but more than anything, it taught me to look for advantages. And that persists with Pol and I through to today. We look around at Australia and think 'what are the advantages?' Agricultural produce, grains, starch, farming, food production, low cost protein – there are many opportunities here.

"And that's how we got into the food industry - by producing bacterial protein for food."

In 1972, David and Polly returned to Sydney where David worked as a Senior Lecturer in chemical engineering at the University of Sydney and Polly worked as a researcher while also looking after the pair's growing family. Five years later, they founded

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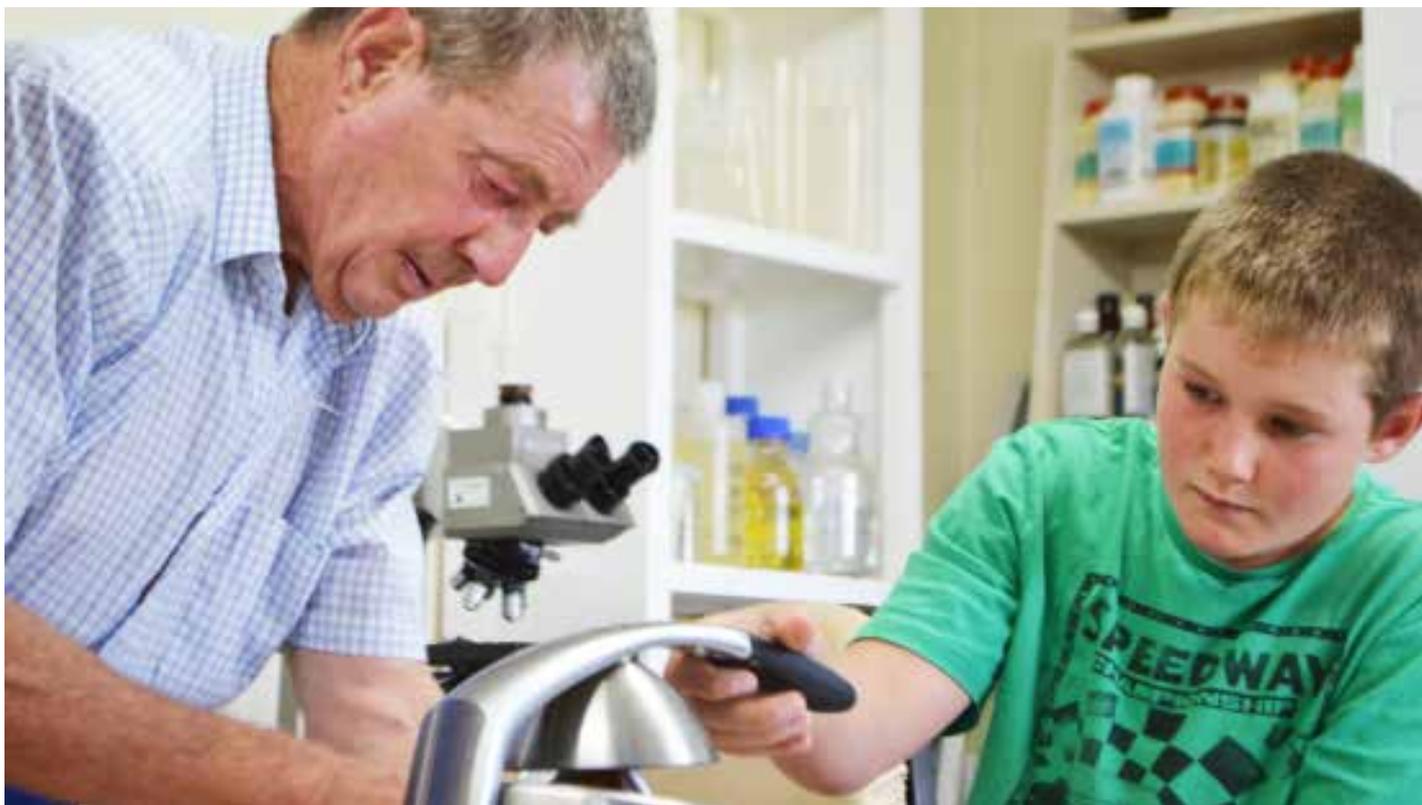
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Biotechnology Australia, the country's first, and for 20 years its largest, private sector biotechnology company.

"We employed the research Pol and I had been into protein production and partnered with a major oil company, a major mining company and a well known brewer to design, build and operate a commercial continuous fermentation plant which exported product to the United States and Japan," said David.

The company gained significant funding for its work in fermentation, and as success grew, moved into the genetic engineering sphere. However, for David and Polly, food science is where their passion lay.

While Biotechnology Australia was taking off, Polly spent years behind the scenes as R&D Manager at Techno-Proteins, another MacLennan enterprise that developed solid-state fermentation technology for producing high quality textured meat alternatives from grains and other starch-based raw materials.

"We gained a worldwide patent for that technology over 30 years ago. We

developed a meat-like substance by growing and treating the hyphae of mushrooms to mimic the fibrous texture of meat," said Polly.

"We had developed it to a point where it was a beautiful piece of technology, and we had vegetarians tell us that they preferred it to many other meat substitutes, but the public wasn't ready for it then. Back then putting fungus on a food label would send people running to the lavatory. Now is probably the right time to launch that product."

Through simple trial and error, David and Polly learnt that timing is everything when it comes to successful business.

"We've had brilliant ideas which were a disaster at the time yet 20 years later they're spot on because the wider community is ready for it. You want to be just far enough ahead of the research so that you're in a position to gauge the public's readiness. And you need to always be looking for where the opportunities are," said David.

With their passion for food innovation

always bubbling, the pair launched Agritechnology in 1985, a company designed to research, develop and commercialise novel technology and products in the agricultural high tech field. Based in Orange in New South Wales' central west, Agritechnology has undertaken extensive research into improving aquaculture farming, continued the MacLennan's work in fermentation by producing a reduced alcohol wine, developed fruit nutraceutical technology and is working to modify the traditional fuel ethanol process to enable co-production of food grade products.

Now almost 30 years on, David and Polly believe Agritechnology's greatest achievement has been to survive as large corporate investment into research companies declines. They say now more than ever, patenting is a crucial tool for research companies to be able to work with large corporations, who are now searching for ready-to-use innovative improvements and solutions for their food production, environmental impact, and bottom lines.

AGRITECHNOLOGY'S ACHIEVEMENTS

Sydney Rock Oysters

David and Polly developed new technology for Sydney Rock Oyster production, which included laboratory scale algal feed production systems and a special warm water culture hatchery using waste heat from a power station. And later expanded to include Pacific oysters.

Australian Native Fish

Agritechnology took a major role in building ANF, a Silver perch farm in Northern NSW. The role included the design and build of the largest warm water fish farm at the time, complete with designing, trialing and manufacturing the ideal diets and feed for the fish.

Reduced alcohol wine

David and Polly used fermentation technology to develop a wine that is less alcoholic but still has the taste, aroma and body of regular wine. This project has taken considerable time and investigated a number of different approaches to solving the fundamental problem with low alcohol wine, which is lack of body.

Cherries

Building on cherries' high levels of anthocyanins and low glycemic index properties, Agritechnology sought to find value in the waste stream of second grade cherries by converting the waste into food and extracting valuable nutraceutical compounds through a controlled enzymatic process to develop shelf stable juice or homogenate.

This process created a product with a high yield, well-defined organoleptic texture and flavour properties, and most importantly, the end product retained a high level of anthocyanins.

Agritechnology today

The company founded by David and Polly and in which they still have a significant role, offers a range of R&D services from technologies developed internally, to proving solutions for customers and joint ventures to develop and commercialise new products and technologies both locally and with international partners. The team focuses on scaling up technology to create industry ready packages, often including test production, quality assurance, regulatory and marketing.

"Big companies want a patent, and not only do they want a patent, they want something they can sell straight away," said Polly.

"Small research companies really have to judge very carefully the paths it goes down because you can easily spend hundreds of thousands of dollars experimenting for a project to then not work or be too new and not accepted by the wider community. So it can be tricky," she said.

"But we're in a fortunate position now that David and I can work in the labs away from the main business and test out different opportunities without disrupting the general timetable of operation of the company."

With their son Donald now calling the shots as Agritechnology's Managing Director, David and Polly work everyday at their home on New South Wales' Central Coast, in their specially built in-house laboratory both for Agritechnology and themselves.

"We're both work fanatics," says David.

"We just like working in the lab and we still spend a lot of time there growing things. It's our main relaxation. Even now, we're working on growing algae feeds to supply the aquaculture market. It always comes back to looking for ways of growing and doing things more efficiently in today's world effected by carbon emissions, environmental impacts, and low investment levels in R&D."

It is this special combination of the pair's scientific talents together with David's opportunistic entrepreneurial spirit and Polly's tireless microbiological research and knowledge of domestic and international patenting requirements, that has made their ventures like Biotechnology Australia and Agritechnology successes. And although there have been failed projects along the way, the pair agree that scientific curiosity and experimentation must continue if Australia is serious about increasing its capacity for innovative, sustainable food production.

"Back when we were working for ICI in England, it was quite something to be working on a project that was providing food for millions of hungry people. The same pride in scientific research needs to here in Australia, where there is so much potential," said David.

"We need scientists in policy making positions and to continually have science on the agenda because it feeds almost every area of our economy. Science must always be at the very highest level." 🍌



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NEW APPROACHES KEEP THINGS BUBBLING ALONG

Engineers in the world's leading beverage companies are using 3D collaborative solutions to ensure product integrity.

Words by *Serena Moreno*

Back when soft drinks were freshly made at pharmacy soda fountains or carried home in capped glass bottles, fizz and taste could be pretty much guaranteed. While the advent of lighter, less-expensive, resealable and recyclable plastics offered many advantages to both consumers and bottlers, maintaining product uniformity in the face of time, climate and travel has become more of a challenge.

The widely used polyethylene terephthalate (PET) beverage bottle of today is made from one of the more impervious of plastics – 40 times more efficient than high density polyethylene (HDPE), for example – but CO₂ and O₂ nevertheless trickle slowly through its walls over time. PET bottles are manufactured via a melting-and-forming, 'stretch-blow moulding' process that orients and crystallises the plastic on the molecular level.

This affects the movement of the two gases through the bottle walls in distinct, complex ways. Although you can see the amount of CO₂ bubbles in a drink for a rough gauge of its fizziness, human eyes are certainly not precise measuring instruments. And taste-robbing oxygenation with O₂ is a largely invisible process.

So, if the objective is to maintain optimum levels of carbon dioxide (CO₂) inside bottles to preserve fizz in those drinks that are supposed to bubble as well as keep oxygen (O₂) out as long as possible, to avoid compromising taste and freshness in both carbonated and still liquids (such as fruit juice, milk and tea), what's an engineer to do?



The heat transfer method is an alternative analysis available in Abaqus software.

3D simulation

The use of realistic simulation through 3D computer representation of an object, the forces that can impact that object, and the resulting stresses and strains over time has provided important answers. Coca-Cola uses a virtual packaging development system, which is based on finite element analysis (FEA), a service Invenio Pty Ltd provides.

Using FEA, the engineers have developed a 'virtual bottle model' that they can modify on their computer screens into whatever shape or material they want, depending on the type of beverage it will be filled with and the manufacturing process that will be used to make it. They can then simulate the effects on the bottle of stacking, crushing, dropping and sloshing to prove out their designs, quickly and cost-effectively modifying

the shapes to make bottles lighter, thinner, stronger, and so on.

Having validated their computer models with real-world tests, they now have a 'library' of highly reliable simulations they can use to perfect existing designs and shorten time-to-market for new ones as products, consumer preferences, and industry regulations change.

Simulating the invisible

For a design engineer, it's fairly straightforward to use FEA to simulate a plastic soft drink bottle hitting the floor. But what about predicting how tiny, invisible molecules of CO₂ or O₂ gas migrate through the walls of that bottle? The engineers at Coca-Cola Beverage Co. Ltd's Global Innovation & Technology Centre (GITC) in Shanghai decided to try. And thanks to the unchanging laws of physics, and

some pretty cool capabilities in their software tools, they've succeeded. The team started with the oxygen problem. How much O₂ passes into a beverage bottle through its PET wall per day? A simulation of this O₂ transmission rate (OTR) phenomenon needed to consider the effects of the bottle's geometry, the 'thickness profile' of the PET wall (thicker or thinner in different places depending on the manufacturing process and the curves of the bottle), and the material characteristics of each 'zone' of bottle thickness (where crystallinity, diffusivity and solubility can vary).

"We investigated two different ways to tackle this problem with Abaqus software," said Dr Simon Shi, senior packaging engineer at GITC. His team first applied the mass diffusion procedure, which simulates the movement of a fluid through a solid over time. Employed in such diverse industries as electronics and energy, it can be applied to everything from moisture absorption in the electronics chip of a phone to hydrogen embrittlement (gas migration through metals) inside a nuclear reactor. In the case of a PET bottle simulation, the 'fluid' moving through the solid is the oxygen.

The mass diffusion procedure starts with an FEA model of the bottle that incorporates the material properties of PET and the as-manufactured wall thickness profile, previously determined from physical tests.

A pressure gradient is loaded into the model to set the starting oxygen concentration inside (lower) and outside (higher) the bottle. When the diffusion simulation is run, the flow of oxygen passing through the bottle wall (always from higher to lower concentrations) appears on the computer screen as a moving rainbow of changing colours (blue is lower, red is higher). The flow will be higher across the thinnest areas of the bottle where there is less plastic for the oxygen to get through, and it will also be affected by the material properties, particularly the crystallinity. "The mass of O₂ that builds up on the inside wall of the bottle over time is what diffuses into the liquid to affect taste and freshness," said Shi.

Another FEA technique that the engineers considered was Abaqus's heat transfer method. This is commonly used in the automotive industry to study thermal performance of powertrain assemblies, and in the

electronics industry to analyse heat and power cycling of components.

"The governing equations used to solve the O₂ question are the same for heat transfer as for mass diffusion," said Shi, "but in this case we were looking at the conduction of temperature (instead of the change in concentration of gas) from one side of the bottle to the other."

With the heat transfer method, the team could use a different type of 3D element as the building block for their models. Elements, used by the hundreds of thousands in an FEA model, are the mathematical units that describe the object being analysed. "We found that the 'shell' elements available in the heat transfer method were more efficient," said Shi.

"They use less computational time than the solid 'hex' ones used in the mass diffusion procedure and gave us slightly more accuracy in this particular case."

As they ran their models, the engineers monitored the heat flux on the inner surface of the bottle, which varies over time due to PET wall thickness and material properties. The engineers did some post-processing of their results from the heat and the mass simulations and found that predicted O₂



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flow rates from both methods came very close to real-world measurements of about 0.04 millilitres of oxygen passing from outside to inside a bottle per day.

“This doesn’t sound like much on a daily basis,” said Shi, “but if that bottle sits on the shelf for too long, those millilitre fractions of oxygen will mount up and impact beverage quality.”

In a bottle of juice, for example, each 1 mg of O₂ that gets into the solution can consume 11mg of Vitamin C, depleting the nutritional value of the drink over time. Knowing now what the oxygen rise rate is – and how to simulate it in their virtual bottle models – Coca-Cola engineers can optimise PET bottle shape, wall thickness, and manufacturing processes to minimise it.

That bottle on the shelf is moving

The second challenge, simulating CO₂ loss, required more steps to solve since the physics of pressure change are more complex than those of oxygen concentration. Freshly bottled Coca-Cola has an inside CO₂ pressure of 60 psi (about the same inflation as a compact spare tyre). When the pressure drops to 78.6 per cent of the initial value the liquid goes ‘flat’. The question is, how long does it take for the drop to occur, and therefore, what is the shelf life of the product?

As an example of a CO₂ loss rate analysis in Abaqus, a greater proportion of the gas passes through the thinner areas of the bottle. To complicate the picture, pressure loss is not due solely to CO₂ leaking out as oxygen leaks in. The bottle itself is also expanding slightly, or ‘creeping’, over time due to the internal pressure. While creep is a natural characteristic of many materials, in a plastic soda bottle it causes the total volume inside the bottle to gradually get bigger, resulting in a secondary drop in pressure.

Lower pressure inside the bottle allows more CO₂ to escape from the beverage into the empty space between liquid and cap. The result: fewer bubbles in the drink itself.

To make their simulations of creep as realistic as possible, engineers began with a laboratory test of a bottle containing some dry ice (frozen CO₂), which would evaporate to create the target pressure of 60 psi. Then they measured how much

the bottle dimensions crept over one week, while at the same time tracking the CO₂ loss rate.

“Starting from these real-world tests gave us highly accurate values for crept-bottle shape, volume and pressure that we could build into our virtual bottle model,” said Shi.

The team then used a heat transfer method CO₂ analysis on their virtual bottle, similar to that done with the oxygen simulations. This time the pressure gradient was set up in reverse from the oxygen flow model, with higher levels set inside instead of outside, to reflect the CO₂ charged state of the bottle.

Plugging the crept-bottle measurements into their model, the engineers could then run their analyses to predict both pressure and volume changes over time. “Simulating these processes takes about two hours – much less time than with physical measurements recorded over a week in the laboratory,” said Shi.

“And O₂ flow simulations only take a couple of minutes. Our FEA models now predict the flow of both carbon dioxide and oxygen gases in PET bottles very reliably. This gives us a more complete picture of what will happen to our products in the real world and provides an efficient way to evaluate bottle performance at the early stages of design.”

Delivering beverage quality

The Coca-Cola engineers see continuing value in their new methodologies going forward.

“Bottles are getting lighter and thinner in response to economic and environmental realities,” said Shi. “We now have a validated methodology that we can use to prove out new concepts in shape and material thickness.

“We plan to explore the behaviour of other materials besides PET, such as plant-based plastics, in the future. Realistic simulation gives us confidence that we will always be able to cost-effectively provide product quality to our customers anywhere in the world market,” he said.

Serena Moreno is head of enterprise solutions at Invenio, provider of 3D collaborative software solutions and services such as FEA and design optimisation to analyse the structural integrity of products.



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QUESTIONS & ANSWERS



Jason Hincks

Jason joined Foodbank Australia from the highly successful men's health charity Movember, where he was chief operating officer. Prior to moving into the not-for-profit space, he developed his marketing, management and strategic skills in organisations both in Australia and the United States.

Jason holds a Bachelor of Business and an MBA, with a specialty in international business and strategy. Jason brings a new and appropriate skill set to Foodbank Australia at a time when raising the organisation's profile and ability to attract funds is paramount to achieving its goals.

As chief executive officer of Foodbank Australia, Jason is part of the Food & Grocery Sector Group of the Trusted Information Sharing Network for Critical Infrastructure Resilience.

Q You've been with Foodbank Australia for almost three months now, having come from Movember. What skills has Movember given you that will help in your role at Foodbank Australia?

A One of the things I am most proud of in my tenure at Movember was helping the organisation's scale and maintaining a great culture through rapid growth. The campaign is now in 21 countries and raises over \$140 million annually. I believe my experience in the areas of rapid growth management and fundraising can help Foodbank reach its goal of ensuring that no-one in Australia goes hungry.

Some of the lessons I learnt at Movember are to build and value your brand and not be afraid to take some calculated risks. Give your constituents remarkable experiences at every touch-point and don't make every communication a request. It also pays to invest in and develop your talent because people are any organisation's biggest asset. If you can create a team of really passionate, creative and empowered individuals, you can achieve remarkable incredible things.

Q What are the biggest challenges facing Foodbank Australia at the moment?

A Foodbank is seeing the number of food-insecure people in Australia increase at an alarming rate. In response we have set the target of doubling our volume to 65 million meals per annum but just when traditional food rescue channels are plateauing due to the tough business environment and increased efficiency in the food industry. We need to find new and innovative ways of sourcing food.

One example of this is our key staple program where we partner with the country's farmers, suppliers, manufacturers, retailers and transporters to proactively source a range of essential foods, such as breakfast cereals, milk, bread, tea, meat, pasta, rice, fruit and vegetables, which need to be available to agencies on a consistent basis.

Q What changes would you like to bring to Foodbank Australia?

A Foodbank has been one of Australia's best kept secrets. I'm confident there aren't many food companies that haven't heard of us or, indeed, aren't donating product to us. Also, there aren't many front line food relief charities that don't access our services. Beyond that, however, and in spite of our massive scale, Foodbank is relatively unknown. The time has come for this to change. We need to build a platform of public awareness from which we can organise funds for activities, and also ensure much-deserved acknowledgement and credit to our industry supporters.

Q The general population's awareness of nutritional value in meals has increased significantly over the past few years. How important is nutritional value in the meals you provide? Is there a demand for it?

A Foodbank's first priority is to provide food to people who would otherwise go without. We work hard to help as many people as we can by accepting all edible food offered to us by food companies and the general public. This said, the role of nutrition is becoming more important in

our operations. We're committed to providing nutrient-rich foods to help promote health outcomes as part of fighting food insecurity. Nutrition is important to everyone but healthy eating is a particular challenge for those who are disadvantaged. Low-income people often don't have the money, education or other resources to eat well.

When it comes to proactively sourcing products, such as through our key staples program, we focus on food which will enhance the overall nutritional profile of our supply. By doing so, we aim to decrease barriers to healthy food choices and improve our community's health.

Q Dry food has traditionally been the mainstay of your meals. What challenges do you face in increasing the amount of fresh produce you distribute? Supply chain issues? Refrigeration?

A Our biggest challenge is the tyranny of distance. To source more fresh food, we are going back to the farm gate to capture the produce that doesn't make it to the markets because it fails to meet quality or aesthetic standards. While it's abundant it's also in rural and remote areas and needs to be brought into the cities for redistribution. Although we do receive assistance with haulage, most notably from TOLL, transportation is still out biggest challenge.

Q Have you found that the food industry is generally receptive to collaborating with and providing food to Foodbank Australia?

A Food companies are the heroes of the Foodbank story. We are simply a conduit between their generosity and the need of the front line charities. The retail value of the food and grocery items donated every year is around \$180 million. That's money that the resource-strapped charities can spend on other essential services to get vulnerable people back on their feet.

Q What opportunities exist currently for food manufacturers to work with Foodbank Australia? Are you looking to collaborate more with particular industries to fill a gap in supply?

A We are always looking for new partners to work with both in relation to capturing their surplus and collaborating on manufacturing essential staples. We are also keen to explore cause-related marketing partnerships to help bridge the gap between demand and supply. 🍎

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BREAKFAST CEREALS AND THEIR CONTRIBUTION TO HEALTH

A systematic literature review published in Advances in Nutrition examines, for the first time, the scientific evidence relating to the role of breakfast cereal in health.

Words by Professor Peter Williams

Dietary fibre is found in fresh fruit, vegetables, grains, cereals, legumes, nuts and seeds. While fibre has a major impact on many aspects of our overall health and wellbeing, it appears to be vital for gut health.

Food Standards Australia New Zealand (FSANZ) defines 'dietary fibre' as "that fraction of edible plants or their extracts or synthetic analogues that are resistant to the digestion and absorption in the small intestine, usually with complete or partial fermentation in the large intestine; and promote one of more of the following beneficial physiological effects – laxation, reduction in blood cholesterol or modulation of blood glucose".

The major types of fibre in our diets include the long-chain fibres; non-starch polysaccharides (NSP, includes cellulose, hemicellulose, pectins, gluans, gums and brans); resistant starch (RS 1-4); and the short-chain 'fibres' such as indigestible oligosaccharides DP3-9, which include galacto-oligosaccharides (GOS such as stachyose and raffinose) and fructans which includes fructo-oligosaccharides (FOS) and inulin (DP10-90).

Dietary fibre (NSP), resistant starch and indigestible oligosaccharides (GOS and fructans) have a number of important effects in the large intestine, many of which involve the action of the colonic microflora and the process of fermentation (including the production of gases). Benefits include improved bulking and laxation; an increase in short chain fatty acids such as acetate,



butyrate and propionate; a decrease in luminal pH; and selective growth of certain bacteria (ie. prebiotics).

One of the most notable pervading myths about fibre and gut health is that all dietary fibres offer the same health benefits. We know from the fibres that have already been extensively studied – including fructans, GOS, resistant starch, pectins, guar gum, psyllium, oats, wheat bran and cellulose – that they all have different effects. Fibres vary in terms of effects on laxation, which short chain fatty acids they produce and the selective growth of certain beneficial bacteria (prebiotic).¹

It is also worth noting that the majority of assays for measuring 'dietary fibre' do not include most types of resistant starch or oligosaccharides (including both GOS and fructans). Consequently, the 'dietary fibre' content of a given food may be underestimated.

In general, however, most Australians are not getting enough fibre in their diet. We should continue to encourage the consumption of a wide range of fibre-rich foods (fresh fruit, vegetables, wholegrains, cereals, legumes, nuts and seeds) to ensure we are all getting enough of all the different fibre types.

FODMAPs and IBS

However, the dietary fibre story takes a turn for sufferers of irritable bowel syndrome (IBS). IBS now affects about one in seven Australians and is the most common reason for visiting a gastroenterologist.

This area of carbohydrate research has been extensively studied at Monash University.² It appears that the fermentation of undigested carbohydrates can have a major impact on people with IBS. The production of gas results in the distension of the gut and this appears to be a major trigger for IBS sufferers. Interestingly, gas production and gut distension occurs in healthy individuals also – but they do not report that this sensation is excessively ‘painful or uncomfortable’ for them. It would appear that individuals with IBS have a highly sensitive gut.

The term FODMAPs (fermentable oligosaccharides, disaccharides, monosaccharides and polyols) was coined by researchers at Monash and refers to this group of ‘indigestible’ carbohydrates that are both small in molecular size and are readily fermented.

FODMAPs include fructose in excess of glucose (found in pears, apples, and honey); fructans, including fructo-oligosaccharides (found in artichokes, garlic, onions, wheat, and rye); galacto-oligo-saccharides (GOS; found in pulses); sugar polyols (found in stone fruits, some vegetables, and artificial sweeteners); and lactose in persons who have lactose malabsorption.

The process of measuring FODMAPs is a very specialised area of carbohydrate research.^{3,4,5} The team at Monash has now tested many hundreds of foods and have the largest FODMAP database in the world. Examples of high FODMAP foods and low FODMAP alternatives are given in Table 1.

In a randomised, controlled trial of patients with IBS, the Monash team investigated the effects of a diet low in FODMAPs compared to a typical western diet.⁶ The results showed that restricting the intake of foods high in FODMAPs reduced colonic fermentation, gas production⁷ and small intestinal fluid volume,⁸ and resulted in marked improvement of symptoms results in the majority of IBS patients.

Table 1: High FODMAP foods and low FODMAP food alternative

Food category	High FODMAP foods	Low FODMAP food alternatives
Vegetables	Asparagus, artichokes, onions (all), leek bulb, garlic, legumes/pulses, sugar snap peas, onion and garlic salts, beetroot, Savoy cabbage, celery, sweet corn	Alfalfa, bean sprouts, green beans, bok choy, capsicum, carrot, chives, fresh herbs, choy sum, cucumber, lettuce, tomato, zucchini
Fruits	Apples, pears, mango, nashi pears, watermelon, nectarines, peaches, plums	Banana, orange, mandarin, grapes, melon
Milk and dairy	Cow’s milk, yoghurt, soft cheese, cream, custard, ice-cream	Lactose-free milk, lactose-free yoghurts, hard cheese
Protein	Legumes/pulses	Meats, fish, chicken, tofu, tempeh
Breads and cereal	Rye, wheat-containing breads, wheat-based cereals with dried fruit, wheat pasta	Gluten-free bread and sourdough spelt bread, rice bubbles, oats, gluten-free pasta, rice, quinoa
Biscuits and snacks	Rye crackers, wheat-based biscuits	Gluten-free biscuits, rice cakes, corn thins
Nuts and seeds	Cashews, pistachios	Walnuts, pumpkin seeds
Hot beverages	Chamomile tea, fennel tea, chai tea (strong)	Instant* (2 heaped teaspoons), green tea, peppermint tea, chai tea (weak)

*Regular or decaffeinated.

This research is significant because it is the first time the impact of a low FODMAP diet had been confirmed over a long term. The trial went for three weeks on each diet while earlier research had confirmed benefits for periods of up to two days on each diet.

The low FODMAP dietary approach is now being used around the world to treat the symptoms associated with IBS and is considered by many gastroenterologists and dietitians working in this area to be ‘a major game changer’ for the management of this common condition.

Tools to translate research

Monash University aims to generate scientific outcomes that have a positive impact on the lives of people in the community. Consistent with this goal the Monash team has created a series of tools to enable their research to be translated into practical advice for healthcare practitioners as well as the individuals who are following the low FODMAP diet. The team has released smartphone apps for both iPhone

and Android devices that makes their comprehensive food compositional database accessible.

In addition, the team is about to launch a new certification program, the Monash University Low FODMAP Certified Program (see the new stamp on the next page). This program aims to make low FODMAP foods easy to identify on the supermarket shelves for people with medically diagnosed IBS.

Not the next gluten-free fad

That said, the team is very conscious of creating yet another food fad. A low FODMAP diet is a special therapeutic diet for treating gastrointestinal symptoms associated with IBS.

People who are healthy and do not have symptoms should not place themselves on a strict low FODMAP diet. A low FODMAP diet should not be viewed as ‘good for digestive health’ and indeed a diet that restricts FODMAP will also restrict ‘prebiotic’ intake (fructans and GOS) which may, in turn, result in changes in the luminal bacterial populations.



While a low FODMAP diet can be nutritionally adequate, the major challenge is dietary fibre intake, as low FODMAP grains and cereal products are often also low in dietary fibre. For this reason, following a low FODMAP diet requires guidance from a qualified dietician with experience in this area.

A low FODMAP diet is also not recommended as a long-term solution for people with IBS. After a good symptomatic response has been achieved, it is recommended to reintroduce FODMAP foods to allow the person to find the level of food restriction required to adequately control symptoms.

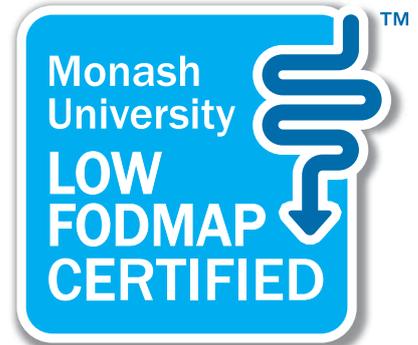
Gluten-free epidemic

It has been observed for a long time, and repeatedly, that wheat induces symptoms such as abdominal bloating in many patients. Because patients often report an improvement in gastrointestinal symptoms while on a gluten-free diet, the gluten in wheat has been assumed to be the culprit.

Monash University's analysis of grain and cereal products has shown that gluten-containing grain products are also high in FODMAPs (mostly fructans and GOS)⁹, so patients may experience symptom improvement when these are avoided due to the lower FODMAP content of the gluten-free products.

The team investigated the specific role of gluten by studying patients who self-reported gluten intolerance but did not have coeliac disease. Findings from the initial study, which was a small parallel-group study, suggested that gluten might worsen symptoms.¹⁰ However, when the protocol was tested in a double-blind, randomised, controlled, crossover study (the gold-standard way of determining food sensitivity), no evidence was found for gluten specifically causing the symptoms in these patients suffering gut conditions they believed to be due to gluten.¹¹

It is more likely that wheat intolerance is due to its FODMAP content than the gluten.



Despite only one per cent of Australians being diagnosed with coeliac disease, more than one in 10 adults now follows a gluten-free or wheat-avoidance diet, needlessly avoiding gluten. Recently published research conducted by CSIRO¹² has found that, of the 11 per cent of Australians who are actively avoiding wheat, one per cent has been diagnosed with coeliac disease, two per cent are doing so despite having no symptoms, and eight per cent are avoiding wheat to combat symptoms, including bloating or abdominal pain (85 per cent) or fatigue (32 per cent).

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Of the eight per cent who avoid wheat because of perceived symptoms, 40 per cent say they are strictly gluten-free. This group is more likely to be women, who like alternative health but are not neurotic, illogical or hypochondriacal. They are influenced by multiple sources – media, internet, health professionals and friends.

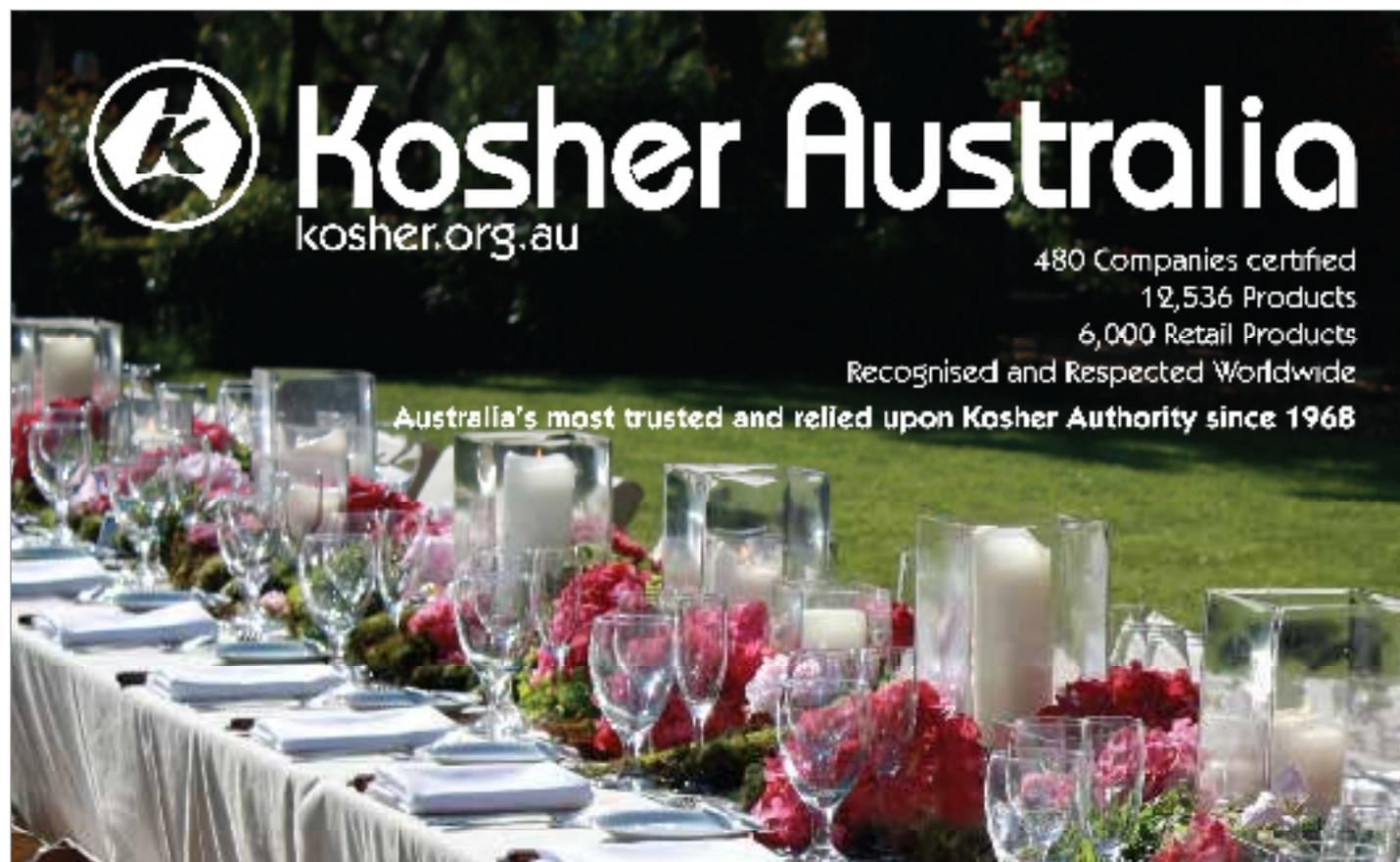
A preliminary study was recently conducted in people claiming to suffer gut symptoms because of gluten. It revealed that short-term exposure to gluten induced ‘feelings of depression’, but had no effect on emotional disposition or gastrointestinal symptoms.¹³ This is an area that warrants further research both in those who believe they are sensitive to gluten and in healthy people.

The gluten-free epidemic has been driven by the often incorrect attribution of the benefits of a gluten-free diet to withdrawal of gluten. Wheat is a complex mixture of substances and only further research will determine how often gluten is the culprit. Current data would suggest not often.

Dr Jane Muir is head of translational nutrition science in the Department of Gastroenterology, Central Clinical School, Monash University. Peter Gibson is Professor and director of Gastroenterology at the Alfred Hospital and Monash University.

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NUTRITION WATCH

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

Words by *Dr Ramon Hall*



Resveratrol helps control glucose and improve insulin sensitivity in diabetics

In a study conducted at the Third Military Medical University in Chongqing, China, researchers undertook a meta-analysis to evaluate the effects of resveratrol (a natural polyphenolic compound mainly found in the skin of red grapes) on glucose control and insulin sensitivity (Lui *et al.*, 2014). The researchers included 11 randomised controlled studies involving 388 participants in the meta-analysis that included measures of glucose control and insulin sensitivity. Studies were evaluated for design quality and the researchers investigated whether a dose response effect was evident for resveratrol on fasting measures of glucose and insulin concentrations in non-diabetic subjects.

This meta-analysis showed that

resveratrol consumption significantly reduced fasting glucose, insulin, haemoglobin A1c (glycated haemoglobin, a longer term marker of glucose control) and insulin resistance (using homoeostatic model assessment) levels in participants with diabetes. However, there were no significant effects of resveratrol on glycemic measures in non-diabetic individuals. Further subgroup and sensitivity analysis indicated that the effects of resveratrol on fasting glucose and insulin levels in non-diabetic individuals were not affected by body mass index, study design, resveratrol dose, duration of study or study quality.

The authors concluded that “resveratrol consumption significantly improved glucose control and insulin sensitivity in patients with type 2 diabetes but did not show a similar effect on non-diabetic participants”.

They also added that further high quality randomised controlled trials with durations greater than three months are needed to confirm the effects of resveratrol on glucose control and insulin sensitivity.

These interesting findings may be of interest to manufacturers of medical foods or mainstream foods aimed at individuals with type 2 diabetes and for manufacturers of resveratrol supplements.

Liu *et al.* (2014) “Effect of resveratrol on glucose control and insulin sensitivity: a meta-analysis of 11 randomized controlled trials”. *American Journal of Clinical Nutrition*. Published online ahead of print (doi: 10.3945/ajcn.113.082024).

Dairy intake helps bone and muscle in elderly

Researchers from Sir Charles Gardiner Hospital and the University of Western Australia have recently shown a positive association between dairy food intake and appendicular bone mineralisation and muscle mass in a group of Australia elderly women (Radavelli-Bagatini *et al.*, 2014).

The study investigated 564 elderly women aged between 80 and 94 years of age who participated in Calcium Intake Fractures Outcomes Study / CAIFOS Aged Extension Study (CAIFOS / CARES) and completed a 10-year follow-up. Dietary intakes were assessed using a validated food frequency questionnaire considering the previous 12 months and specific analysis of dairy food intake was undertaken (including milk, yoghurt and cheese). Volumetric bone mineral density (vBMD) and 15% tibia bone mass were assessed using peripheral quantitative computed tomography (pQCT). Skeletal muscle mass and

appendicular bone mass were determined using dual-energy X-ray absorptiometry (DXA). The elderly women were categorised into tertiles of dairy food intake as follows: first tertile (≤ 1.5 servings/day); second tertile (1.5 to 2.2 serving/day) and third tertile (≥ 2.2 serving/day). The analysis was adjusted for potential confounding factors such as age, BMI, physical activity, smoking, calcium and vitamin D supplementation.

The results showed that there was a significant 5.7% advantage for women in the third tertile compared to the first tertile for 15% tibia bone mass which the authors suggested was principally linked to the increase in cortical and subcortical bone mass of 5.9%. Again compared to the first tertile, there was a significant 6.2% increase of total vBMD for women in third tertile. Trabecular vBMD was also significantly higher (7.8%) for women with the highest tertile of dairy compared to the lowest tertile. Appendicular bone mass and skeletal muscle mass was also significantly higher (7.1% and 3.3% respectively) in women in the third tertile compared to the first tertile.

The authors concluded that "our results suggest a positive association of dairy intake with appendicular bone mineralisation and muscle mass in elderly women. Elderly women with mean dairy food intake of 2.8 servings per day had significantly better bone structure at the appendicular skeleton and skeletal muscle mass compared

with those with mean dairy food intake of 0.9 servings per day. Because many fractures in this age group are of the appendicular skeleton often associated with falls, following the dietary guidelines of four serving of dairy foods per day may be a modifiable lifestyle factor contributing to healthy aging in older women."

Radavelli-Bagatini *et al.* (2014) "Dairy food intake, peripheral bone structure, and muscle mass in elderly ambulatory women". *Journal of Bone and Mineral Research*, 29(7): 1691-1700 (doi: 10.1002/jbmr.2181).

Contribution of processed food to nutrition

The American Society for Nutrition has recently released a scientific statement entitled, "Processed foods: contributions to nutrition" that focuses on the nutritional impacts of processed foods and was written by a team of highly regarded scientists led by Distinguished Professor Connie Weaver (Weaver *et al.*, 2014). The statement is written in an American context referencing American Dietary Guidelines (Dietary Guidelines for Americans) and dietary data (NHAMES). However, there should still be some learnings from this statement for the Australian context.

The scientific statement was written to address: how processed foods contribute to the health of populations; what contribution of processed foods make to "nutrients to encourage" and "components to limit" in the diet compared to recommendation within the Dietary Guidelines for Americans,



identify the responsibilities of various stakeholders in improving the American diet, and highlight emerging technologies and the research needed for a better understanding of the role of processed foods in a healthy diet.

Using analysis from NHAMES 2003-2008 in conjunction with reference to the 2010 Dietary Guidelines for Americans, in relation to nutrients to encourage, it was estimated that processed foods provided: 55% dietary fibre; 48% calcium; 43% potassium; 34% vitamin D; 64% iron; 65% of folate and 46% of vitamin B12. Using the same approaches for potential constituents to limit, processed foods were estimated to contribute 57% of energy; 52% saturated fat; 75% of added sugars and 57% of sodium.



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The authors made the comment that “diets are more likely to meet food guidance recommendations if nutrient-dense foods, either processed or not, are selected.”

The scientific statement identified major factors affecting the food supply for Americans in coming years including: population growth; food insecurity; globalisation of food supply; food-borne illness; ageing population and increased non-communicable chronic degenerative diseases; economic recession; women in the workforce and time constraints; consumer demands and competition at retail level. In particular, the statement suggested that action is required to enhance the contribution that processed foods make to nutritional and food security. There is also a need to address the potential lack of consumer understanding of beneficial food processing techniques and for nutrition and food science professionals to enhance the understanding of the role of food processing in meeting nutritional needs while understanding societal and consumer wants.

The scientific statement identified current and future food processing technology innovations with potential benefits to consumers including: opportunities to reduce energy intake; help enhance gut health; reduce salt intake; enhance health benefit of foods; improve food safety and reduce food waste; reduce allergy; promote fresh but stable foods and produce age-specific products. For example, to reduce energy intake, opportunities to use modified starches to resist digestion; use of non-caloric natural sweeteners such as stevia and better use of flavour chemistry and texture enhancements to induce satiety. A range of other technologies were highlighted in relation to the other areas that would benefit consumers.

The scientific statement concluded that: “In this assessment of the nutritional impacts of processed foods, we conclude that processed foods are nutritionally important to American diets. They contribute to both food security (ensuring that sufficient food



is available) and nutrition security (ensuring that food quality meets human nutrient needs). Research has shown that processed foods provide both nutrients to encourage and constituents to limit as specified in the 2010 Dietary Guidelines for Americans. Therefore, although food processing has had positive impacts on human health, some of those successes have produced foods that, when consumed inappropriately or at inordinately high proportions of a total diet, are deleterious to health.

Diets are more likely to meet food guidance recommendations if nutrient-dense foods, either processed or not, are selected.”

Weaver *et al.*, (2014) “Processed foods: contribution to nutrition”. *American Journal of Clinical Nutrition*, 99: 1525-1542, (doi: 10.3945/ajcn.114.089284).

Differential effects of sugars on satiety in boys

Researchers from Ryerson University in Toronto, Canada, have recently completed a study where they investigated the effect of isocaloric solutions of several different sugars and a non-caloric sweetener on subjective appetite and food intake in nine- to-14-year-old normal weight boys (Van Engelen *et al.*, 2014). They compared three isocaloric sugar solutions (200 kcal/250 ml) including:

sucrose, high-fructose corn syrup-55 (HFCS) or glucose and a non-caloric sucralose control solution. In a cross-over designed randomised controlled trial, a total of 15 boys consumed each of the four variant solutions in a randomised order on different days and consumed an ad libitum pizza meal 60 minutes after the each solution. Subjective appetite ratings were measured at baseline (0 minutes) and again at 15, 30, 45 and 60 minutes after consuming each solution.

The results revealed that only the glucose solution significantly reduced food intake after 60 minutes (975 ± 58 kcal) compared with the sucralose control (1127 ± 56 kcal), but this was not the case for either the sucrose solution (1074 ± 81 kcal) nor the HFCS solution (1075 ± 65 kcal). When accounting for the additional energy content of the three sugar variants, this led to a higher cumulative energy intake compared for the sucrose and HFCS variants compared to the sucralose, but not the glucose variant. Also, after all treatment sessions, subjective average appetite increased from baseline to 60 minutes, but change from baseline average appetite was the higher after sucrose compare to the other variants. Additionally, both sucrose and HFCS variants (but not glucose) were inversely associated with test meal

food intake when treatment dose (200 kcal) was expressed on a body weight (kg) basis.

The authors concluded that “change from baseline subjective average appetite was the highest after sucrose, but only the glucose solution suppressed FI at the test meal 60 minutes later in normal weight boys.”

Van Engelen *et al.* (2014) “Effect of sugars in solutions on subjective appetite and short-term food intake in 9 to 14 year old normal weight boys”. *European Journal of Clinical Nutrition*, 68, 773-777 (doi:10.1038/ejcn.2014.33).

Magnesium helps physical performance in elderly women

Researchers from the University of Padova in Italy have undertaken a study to investigate whether 12 weeks of oral magnesium supplementation can improve physical performance in healthy elderly women, as magnesium deficiency is known to be associated with poor physical performance (Veronese *et al.*, 2014). A total of 139 healthy elderly women (71.5 ± 5.2 years) undertook a parallel-group design randomised controlled trial. All participants undertook a mild fitness program and were randomly assigned to a treatment group (300mg magnesium oxide/day; n = 62) or to a control group (no placebo or treatment; n = 77). Participants in the study were assessed at baseline and again after 12 weeks. The primary outcome was a change in short physical performance battery (SPPB) (involving three objective physical function tests: four minute gait speed; repeated chair stands and standing balance in increasingly challenging positions) and secondary outcomes were changes in peak isometric torque and isokinetic strength of lower limbs and handgrip strength.

The results indicate that after 12 weeks of magnesium supplementation group had a significantly better SPPB score compared to the control group, which was mainly due to improved

chair stand time performance and four minute walking speed. The authors note that these findings were more evident in participants with a magnesium dietary intake lower than the recommended dietary allowance. There were no noted significant effects for magnesium supplementation related to the isokinetic or isometric muscle strength measures.

The authors conclude that “oral supplementation with 300 mg of magnesium in the form of magnesium oxide for 12 weeks had a significant positive effect on physical performance, as assessed with the SPPB and gait speed and chair stand times in healthy elderly women. These findings suggest a role for magnesium supplementation in preventing or delaying the age-related decline in physical performance, particularly in magnesium-deficient individuals. Further research is needed to understand the influence of magnesium supplementation on physical performance in elderly people with different magnesium concentrations.

These findings may be of interest to manufacturers of medical foods or food aimed at the elderly and for manufacturers of magnesium supplements.

Veronese *et al.* (2014) “Effect of oral magnesium supplementation on physical performance in healthy elderly women involved in a weekly exercise program: a randomized controlled trial”. *American Journal of Clinical Nutrition*, Published online ahead of print (doi: 10.3945/ajcn.113.080168). ¹⁵

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It's what's inside the Australian finger lime that has set the leading chefs and international markets a buzz.

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Each finger lime holds hundreds of individual juice vesicles, sometimes called crystals, which range in colour from lime green to bright magenta. It's the fruit's remarkable pulp that has earned it the nicknames of 'citrus caviar'.

Scientifically known as *Citrus australasica*, finger limes grow on thorny trees and shrubs in the rainforests bordering New South Wales and Queensland.

The commercial potential of finger limes was first identified more than 100 years ago with records in the United Kingdom's Kew Economic Botany Collection, dating back to 1895.

Yet it's only been in the past 20 years that commercial production has begun in earnest, with varieties of native finger limes collected from the bush and grafted onto modern citrus stock to improve quality and consistency of production.

"You want finger limes with colour, flavour and easy to extrude pulp and have a good shelf life," said Judy Viola who was one of the first people to propagate finger limes in 1989.

There are around 30 commercial growers in Australia with orchard sizes ranging from small plantings of 30 trees to larger orchards of 4000 plus trees. One of the larger commercial growers and exporters is Fred Durham, CEO of the Australian Finger Lime Company.

"At the moment, most of our limes are exported to Europe, USA and Asia as the fruit is better known overseas. This demand is driven by countries with larger customer bases, more high-end restaurants and more people looking for something exotic that are willing to spend the money," said Durham.

The finger lime season can start as early as November and run as late as July. The fruit can also be frozen for up to a year with minimal deterioration to their unique texture.

Georgie MacDougall from Wild Fingerlime has been actively involved in the industry since 2004, leading the way with the exporting of fresh fruit to Europe. She is now exploring processing and has developed a machine to remove the pulp so it can be sold in containers like caviar.

"If we can process the limes it will help to create a product that has a longer shelf life, ensure it's available year round, and reduce the labour intensive process of removing the pulp. While there will always be a market for fresh and frozen fruit, readily accessible pulp would be ideal for bars to use in cocktails and it would open markets in the USA," said MacDougall.

"Locally it would allow the industry to expand and ensure growers could sell all their produce as a lot of fruit is lost due to scratches or sun damage. The pulp is still perfect and these limes would be ideal for processing. It's early stages but it's very exciting."

A 2008/2009 Government data estimated total production of finger limes in Australia at around 10 tonnes with about half exported to Europe and Asia. International wholesale prices range between \$35-\$40 a kilogram and domestically wholesale prices are \$20-\$25 a kilogram.

Domestically, finger limes are primarily sold to restaurants, caterers and the general public both directly and via wholesale markets. Finger lime converts include highly respected Australian chefs, including Shannon Bennett, Ben Shewry and Christine Manfield.

Although there are challenges handling and displaying the fruit, Fred Durham said the key now was to establish a presence in supermarkets. "We hope to one day establish national distribution and enable more Australians to experiment with this truly amazing bush food." 🍋



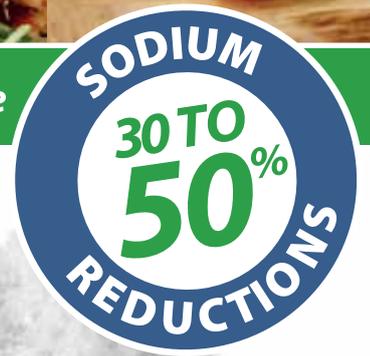
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