PROGRAM*

*Program may be subject to change. Current at time of printing.

Lawrence Haddad, Executive Director
Global Alliance for Improved Nutrition (GAIN)

Dr Lawrence Haddad is a South African-born British economist. He was appointed the Executive Director of the Global Alliance for Improved Nutrition (GAIN) in October 2016. Working with partners around the world, GAIN aims to make healthier food choices more affordable, more available, and more desirable. GAIN's purpose is to improve nutrition outcomes by increasing the consumption of nutritious and safe food for all people, especially the most vulnerable.

Prior to this, Dr Haddad was the founding co-chair and lead author of the Global Nutrition Report and was the Director of the Institute of Development Studies (IDS), the world's leading development studies institute. Before joining IDS in 2004, he was Director of the Food Consumption and Nutrition Division at the International Food Policy Research Institute and was a UK representative on the Steering Committee of the High Level Panel of Experts of the UN's Committee on World Food Security.

In 2018, the World Food Prize Foundation awarded the World Food Prize to Dr Haddad and Dr David Nabarro, former special adviser to the UN Secretary General. They received the award for their individual and complementary global leadership in elevating maternal and child undernutrition to a central issue within the food security and development dialogue at national and international levels.

Why animal-source foods need to be part of the global food security and nutrition agenda

A number of recent reports on diets and food systems have generated a great deal of divisive debate about the role of animal source foods in the human diet. The media have latched on to these debates and have, in some cases, accentuated the divides. This presentation will emphasise not division, but inequality. It is the inequality in what people eat that needs to be addressed. Many people eat far too much animal sourced food: too much for their health and too much for the planet's environmental health. But many also eat too little animal sourced food—these foods are rich sources of micronutrients that are essential for young infant and child growth and are not available in other affordable foods for these populations who tend to be low income. So a nuanced approach to animal sourced foods is needed. Those who eat too much for their good health and who put unnecessary stress on the planet's environmental resources should eat less and those who are undernourished with very monotonous diets would benefit from eating more. This presentation explores this contested terrain and aims to improve clarity in the policy space surrounding animal source foods.

ILRI INTERNATIONAL LIVESTOCK RESEARCH INSTITUTE CGIAR

Usha Zehr, Director and Chief Technology Officer
Maharashtra Hybrid Seeds Company Private Limited (Mahyco)

Dr. Usha Barwale Zehr is the Director and Chief Technology Officer at Maharashtra Hybrid Seeds Company Private Limited (MAHYCO) in India. She received her PhD from the University of Illinois at Urbana-Champaign.

For the past 20 years, she has been utilising new technologies and tools including biotechnology for improving the quality and productivity of seeds and agriculture. In addition, Dr. Zehr serves as Director of the Barwale Foundation, a non-profit research foundation. She also serves on the Board of the Donald Danforth Plant Science Center and Alliance for Green Revolution in Africa.

Mahyco focuses on research and development, production, processing, and marketing of seeds for Indian farmers. Founded in 1964, Mahyco is the pioneer of high-quality hybrid and open pollinated seeds, through the use of cutting-edge technology and intensive research activities.

Dr. Zehr served as a geneticist at Purdue University, studying sorghum and millet and focusing on the application of plant biotechnology for improving agricultural production. During her graduate and post-graduate studies, she worked in the area of tissue culture and transformation. Her group at the University of Illinois was the first to develop a system for soybean regeneration. As a result of her work at Purdue University, the first transgenic sorghum plant was produced. Her work in plant biotechnology is aimed toward implementing emerging technologies in the developing world.

Small holder farmers and science of tomorrow

Small Holder farmers in India have benefited from the scientific advances be it the high yielding varieties of Green revolution or the most recent revolution with the use of Bt cotton leading to livelihood improvement. The small holder farmers in India will continue to feed the nation and more under several environmental constraints which require rededicated effort in agricultural sciences. Application of new science to agriculture is critical be it New Breeding Technologies, greater focus on soil health, water use efficiency and more. Farmers are also constrained by what they have access to, where their inputs come from and where they will go to market their harvest. Indian farmers are using mobile phones in large numbers, from basic to smart phones and with relatively cheap access to data, are using these devices to share information. Digital platforms which provide information on weather, soil health, carbon status, predict yield, financial transactions or market opportunities in addition to the genetic improvements are being delivered to farmers in local languages and impacting their decision making and improving lives. Policies around new innovation must be clear to deliver the benefits of these advances to the farmers. These innovations are shaping the future of science for small holder farmers and may even entice the youth to continue to farm.

07:00-20:00	**Registration desk open**	Plaza Auditorium foyer, Plaza level, Brisbane Convention & Exhibition Centre, Grey Street, South Brisbane
08:00	**Conference welcome**	The University of Queensland
	Conference opening	Queensland Government
08:45-10:00	**Plenary session 1**	
	Room	Plaza Auditorium
	Chair	Prof Robert Henry, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI)
08:45	**Keynote speaker**	**Why animal-source foods need to be part of the global food security and nutrition agenda - 100** Dr Lawrence Haddad, Executive Director, Global Alliance for Improved Nutrition (GAIN), Switzerland
09:20	**Keynote speaker**	**Small holder farmers and science of tomorrow - 101** Dr Usha Zehr, Director and Chief Technology Officer, Maharashtra Hybrid Seeds Company Private Limited (MAHYCO), India
10:00	**Morning tea**	

Growth Agriculture

10:30-12:30 Concurrent symposia session 1

FIELD CROPS
Room ▸ P7-8

1.1 ▸ Agricultural systems research: A transformative approach to the sustainable intensification of agriculture

Chair ▸ Prof John Dixon, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia

Agricultural systems research: A transformative approach to sustainable intensification - 104
▸ Prof Daniel Rodriguez, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia

Food systems failure: Can we avert future crises? - 106
▸ Dr Kiah Smith, The University of Queensland, Australia

Farming systems analysis for problem-solving in the R4D context - 107
▸ Dr Sarina Macfadyen, Australian Centre for International Agricultural Research, Australia

Transformational adaptation in agriculture under climate change - 102
▸ Prof Mark Howden, Australian National University, Australia

Transforming agricultural biosecurity - 103
▸ Assoc Prof Grant Hamilton, Queensland University of Technology, Australia

Transforming landscapes through irrigation - 105
▸ Dr Matthew Harrison, Tasmanian Institute of Agriculture (TIA), Australia

HORTICULTURE
Room ▸ P9

1.2 ▸ Tissue culture for propagation, conservation and crop improvement

Chair ▸ Prof Neena Mitter, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia

In vitro approaches for papaya crop improvement - 108
▸ Dr Puthiyaparambil Josekutty, Skybury Coffee Pty Ltd, Australia

The use of cryobiotechnology to conserve plant genetic resources: Opportunities and challenges - 109
▸ Dr Raquel Folgado, The Huntington Botanical Gardens, USA

Tissue culture for the collection, conservation and multiplication of elite coconut germplasm - 110
▸ Prof Steve Adkins, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia

Developments in banana tissue culture in Australia - 111
▸ Ms Sharon Hamill, Department of Agriculture and Fisheries, Queensland Government, Australia

Micropropagation of recalcitrant *Persea Americana* rootstock cultivars - 112
▸ Dr Jayeni Hiti-Bandaralage, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia

Enhancing product development by use of double haploid - 113
▸ Dr Usha Zehr, Maharashtra Hybrid Seeds Company Private Limited (MAHYCO), India

LIVESTOCK
Room ▸ P10

1.3 ▸ Sustainable, healthy diets for all: Tomorrow's livestock science

Chair ▸ Prof Lindsay Falvey, International Livestock Research Institute (ILRI), Kenya; The University of Melbourne, Australia

Let them eat meat? A solution or a problem for a sustainable healthy future? - 114
▸ Dr Lawrence Haddad, Global Alliance for Improved Nutrition (GAIN), Switzerland

The quest for policy and public expenditure opportunities to support implementation of sustainable smallholder livestock and aquaculture interventions - 115
▸ Dr Robyn Alders, Centre for Global Health Security, Australia

Facts and myths: Livestock and the environment - 116
▸ Dr Mario Herrero, Commonwealth Scientific and Industrial Research Organisation (CSIRO); The University of Queensland, Australia

Success example: The potential for livestock methane mitigation - 117
▸ Prof Richard Eckard, The University of Melbourne, Australia

Productivity – intensification – animal welfare: Synergies or trade-offs? - 118
▸ Dr Rebecca Doyle, The University of Melbourne, Australia

Informing tomorrow's livestock science: Opportunities to transform food systems in tropical developing regions - 119
▸ Dr Anna Okello, Australian Centre for International Agricultural Research (ACIAR), Australia

NUTRITION AND FOOD
Room ▸ P11

1.4 ▸ Market-led breeding for value chains: Africa-Australia nexus for innovation

Chair ▸ Dr Vivienne Anthony, Syngenta Foundation for Sustainable Agriculture, Switzerland

Australia-Africa Universities Network: Providing sustainable solutions to challenges jointly facing Australia and Africa - 120
▸ Prof Kadambot Siddique, University of Western Australia, Australia

Delivering market requirements: Product profiling with market foresight for bean value chains in East Africa - 121
▸ Dr Jean Claude Rubyogo, International Centre for Tropical Agriculture (CIAT); Pan Africa Bean Research Alliance (PABRA), Tanzania

Public-private breeding transition in sorghum in Australia and lessons for sub-Sahara Africa - 122
▸ Prof David Jordan, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia

Introducing market-led approaches into postgraduate plant-breeding education programs in Africa - 123
▸ Prof Shimelis Hussein, Africa Centre for Crop Improvement (ACCI), South Africa

Africa's plant breeders and their variety portfolio for farmers and markets: Opportunities and challenges - 124
▸ Dr Nasser Yao, International Livestock Research Institute (ILRI), Kenya

Demand led breeding - 125
▸ Prof Gabrielle Persley, The University of Queensland, Australia

Panel discussion

AGFUTURES
Room ▸ Plaza Auditorium

1.5 ▸ Strategic issues facing agricultural development in northern Australia

Chair ▸ Ms Sheriden Morris, CRC for Developing Northern Australia, Australia

Successfully facilitating agricultural investment in northern Australian landscapes - 126
▸ Dr Allan Dale, CRC for Developing Northern Australia; James Cook University, Australia

A situational analysis for developing a rice industry in northern Australia - 127
▸ Prof Robert Henry, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia

Northern beef industry emerging market, supply chain gap analysis & sector capacity baseline study - 128
▸ Dr Chris Chilcott, Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia

Preparing the way for growth in aquaculture in northern Australia: Industry priorities and vision 2028 - 129
▸ Prof Dean Jerry, Centre for Sustainable Tropical Fisheries and Aquaculture; ARC Research Hub for Advanced Prawn Breeding, James Cook University, Australia

Northern Australia forestry situational analysis project - 130
▸ Mr Mick Stephens, Timber Queensland, Australia

Business on country: Land use diversification on the Indigenous estate - 131
▸ Mr Ricky Archer, North Australian Indigenous Land and Sea Management Alliance Ltd, Australia

12:30 **Lunch and poster presentations**
Poster themes: Livestock and AgFutures

13:30-15:30 **Concurrent symposia session 2**

FIELD CROPS
Room ▸ P7-8

2.1 ▸ Climate-smart wheat
Chair ▸ Dr Karine Chenu, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia

Transformational wheat agronomy: Success from system synergy - 132
▸ Dr John Kirkegaard, Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia

Delivering traits for improved adaptation to future climates - 133
▸ Dr Greg Rebetzke, Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia

Combining trait physiology, crop modelling and molecular genetics to improve wheat adaptation to terminal water-stress by targeting stay-green and root traits - 134
▸ Dr Jack Christopher, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia

Increasing heat tolerance in wheat to counteract recent and projected increases in heat stress - 135
▸ Dr Najeeb Ullah, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia

Tracking a major gene increasing wheat biomass and yield in hot environments - 136
▸ Dr Penny Tricker, The University of Adelaide, Australia

New advances in phenotyping technologies - 137
▸ Dr Xavier Sirault, Australian Plant Phenomics Facility; Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia

HORTICULTURE
Room ▸ P9

2.2 ▸ Beyond pretty pictures: Horticulture tree crop mapping, from individual fruit to a national database
Chair ▸ Dr Anthony Kachenko, Hort Innovation, Australia

Matching technology with need - 138
▸ Mr Chad Simpson, E.E. Muir & Sons Pty Ltd, Australia

Forward estimation of mango crop load and harvest timing based on in-field machine vision and handheld spectroscopy - 139
▸ Prof Kerry Walsh, Central Queensland University, Australia

Efficient and detailed orchard maps: Flowers, fruit, ripeness, canopy light interception and yield - 140
▸ Dr James Underwood, The University of Sydney, Australia

The appropriate use of UAVs and Lidar for mapping tree crop canopy structure and health - 141
▸ Ms Dan Wu, The University of Queensland, Australia

Exploring the potential of high resolution satellite imagery for yield prediction of Avocado and Mango crops - 142
▸ Dr Moshiur Rahman, Applied Agriculture Research Centre (AARSC), University of New England, Australia

National scale mapping of horticulture tree crops in Australia - 143
▸ Mr Craig Shephard, The University of New England, Australia

LIVESTOCK
Room ▸ P10

2.3 ▸ Nutrition strategies to mitigate high environmental temperatures in cattle, pigs, and chickens
Chairs ▸ Assoc Prof Eugeni Roura and Assoc Prof John Gaughan, The University of Queensland, Australia

Management of cattle exposed to high environmental temperatures - 144
▸ Prof Terry Mader, University of Nebraska, USA

Nutritional strategies to mitigate effects of high environmental temperature - 145
▸ Assoc Prof John Gaughan, The University of Queensland, Australia

Metabolism and endocrinology of cattle in high environmental temperatures - 146
▸ Dr Gene Wijffels, Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia

Physiological adaptations of pigs under high environmental temperatures - 147
▸ Dr Jeremy Cottrell, The University of Melbourne, Australia

Nutritional strategies to mitigate heat stress in pigs - 148
▸ Prof Frank Dunshea, The University of Melbourne, Australia

Nutritional strategies to mitigate heat stress in chickens - 149
▸ Assoc Prof Eugeni Roura and Assoc Prof Chiara Palmieri, The University of Queensland, Australia

NUTRITION AND FOOD
Room ▸ P11

2.4 ▸ Creating an Australian cuisine through traditional Australian foods
Chair ▸ Assoc Prof Yasmina Sultanbawa, ARC Training Centre for Uniquely Australian Foods, Australia

Can we create a sustainable functional food market using Australian native plant foods? - 150
▸ Dr Mridusmita Chaliha, ARC Training Centre for Uniquely Australian Foods, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia

Integration of Aboriginal culture and history through bush food enterprises - 151
▸ Ms Madonna Thomson, Jagera Daran, Nyanda Aboriginal Cultural Tours and Bush Food Experience, Australia

Australian cuisine and traditional food flavours - 152
▸ Dr Heather Smyth, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Centre for Nutrition and Food Sciences (CNAFS), Australia

Nutritional value of Australian traditional foods and diet diversification from a global perspective - 153
▸ Prof Michael Rychlik and Dr Michael Netzel, Technical University of Munich, Germany

Influence of traditional South African food preparation methods on functional compounds - 154
▸ Prof Dharini Sivakumar, Tshwane University of Technology, South Africa

Designing meal plans for the food service sector using traditional Australian foods - 155
▸ Dr Olivia Wright, The University of Queensland, Australia

AGFUTURES
Room ▸ Plaza Auditorium

2.5 ▸ Value-adding opportunities for agriculture through Biofutures
Chair ▸ Prof Ian O'Hara, Queensland University of Technology, Australia

Wastes to profits – delivering advanced bioproduct technologies for agriculture - 156
▸ Mr Doug McNicholl, Meat and Livestock Australia, Australia

Energy and feed products from waste: Applying the circular economy to agricultural industries - 157
▸ Dr Paul Jensen, Advanced Water Management Centre, The University of Queensland, Australia

Low cost and flexible production of biofuels and biochemicals - 158
▸ Dr Darryn Rackemann, Queensland University of Technology, Australia

How synthetic biology will transform the Australian biotechnology industry - 159
▸ Assoc Prof Claudia Vickers, Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia

Mapping biomass resources in Queensland - 160
▸ Ms Kelly Bryant, Department of Environment and Science, Queensland Government, Australia

Lignocellulosic biomass as a bioeconomy platform – industry perspectives - 161
▸ Mr Alex Baker, Leaf Resources Ltd, Australia

Queensland Government

15:30 Afternoon tea

16:00-18:00 Concurrent symposia session 3

FIELD CROPS
Room ▸ P7-8

3.1 ▸ Farming system intensification for small-holders
Chair ▸ Sarina Macfayden, Australian Centre for International Agricultural Research (ACIAR), Australia

Trees for food security: How is it stacking up in East Africa? - 162
▸ Prof Catherine Muthuri, World Agroforestry Centre (ICRAF), Kenya

Fostering sustainable agricultural intensification in Eastern and Southern Africa: Agronomic, institutional and policy enablers - 163
▸ Dr Paswel Marenya, International Maize and Wheat Improvement Center (CIMMYT), Africa

Sustainable intensification in the Eastern Gangetic Plains: Key to food security and livelihood improvement of smallholders - 164
▸ T.P. Tiwari, International Maize and Wheat Improvement Center (CIMMYT), Bangladesh

Sustainable intensification in rice production and processing chains (Laos and Cambodia) - 165
▸ Ms Jaquie Mitchell, The University of Queensland, Australia

Assessments of lowland rice-based farming systems and prospects for future research and development priorities - 166
▸ Van Touch, The University of Sydney, Australia

Outcomes of agroforestry and monocropping - Comparison and assessment - 167
▸ Dr La Nguyen, World Agroforestry Centre (ICRAF), Vietnam

HORTICULTURE
Room ▸ P9

3.2 ▸ Future orchards: Advances in horticultural tree research
Chairs ▸ Dr Bruce Topp, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia
▸ Dr Jose Chaparro, University of Florida, USA

Understanding early orchard productivity in macadamia - 168
▸ Dr John Wilkie, Department of Agriculture and Fisheries, Queensland Government, Australia

Genomics and the macadamia orchard of the future - 169
▸ Dr Cathy Nock, Southern Cross University, Australia

Benchmarking and farm economics of Australian macadamia production: What makes a modern orchard productive? - 170
▸ Mr Shane Mulo, Department of Agriculture and Fisheries, Queensland Government, Australia

Extending a breeding information management system to combine international data for global performance predictions - 171
▸ Dr Craig Hardner, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia

Improvement of citrus cultivars through introgression of wild germplasm - 172
▸ Dr Jose Chaparro, University of Florida, USA

Breeding macadamia cultivars for orchards of the future - 173
▸ Dr Mobashwer Alam and Ms Katie O'Connor, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia

LIVESTOCK
Room ▸ P10

3.3 ▸ Advancing animal productivity and welfare with genomics
Chair ▸ Dr Marina Fortes, The University of Queensland, Australia

Genome editing in poultry: Opportunities and impacts - 174
▸ Dr Kristie Jenkins, Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia

Selecting for behavioural traits in animals – what could we change and should we? - 175
▸ Dr Jill Fernandes, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia

Castration free swine through gene editing of porcine KISS1 - 176
▸ Dr Tad Sonstegard, Acceligen a Recombinetics Company, USA

Naturally Polled TM – improving the welfare of dairy cattle - 177
▸ Dr Carl Ramage, Rautaki Solutions Pty Ltd, Australia

Differences in thermoregulatory responses between Dorper and second cross lambs to heat stress challenges - 178
▸ Ms Aleena Joy, The University of Melbourne, Australia

A study on DNA methylation from bovine tail hair and liver tissues - 179
▸ Dr Loan Nguyen, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia

NUTRITION AND FOOD
Room ▸ P11

3.4 ▸ Biofortification of crops for human health
Chair ▸ Prof Roger P Hellens, Queensland University of Technology, Australia

The inside and out of folate in strawberries and avocados - 180
▸ Dr Michael Netzel, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia

Zeaxanthin-biofortified popcorn for eye health - 181
▸ Dr Tim O'Hare, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia

Folate in durian and other tropical exotics - 182
▸ Prof Michael Rychlik, Technical University of Munich, Germany

Super-sweet purple sweetcorn: Breaking the genetic link - 183
▸ Mr Apurba Lal Ray, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia

Filling the void – boosting the nutritional value of blueberry - 184
▸ Dr Richard Espley, The New Zealand Institute for Plant and Food Research Limited (PFR), New Zealand

Soil and foliar Zn fertiliser application as strategies of agronomic biofortification for sweetcorn grown in soils with varying Zn status - 185
▸ Mr Zhong Xiang Cheah, The University of Queensland, School of Agriculture and Food Sciences, Australia

AGFUTURES
Room ▸ Plaza Auditorium

3.5 ▸ Innovation in food safety and traceability
Chair ▸ Mr Jim Dodds, Safefood Queensland, Australia

Food tampering – what we can learn from strawberries - 186
▸ Ms Clare Hamilton-Bate, Freshcare Ltd, Australia

Supply chain integrity – managing food safety and food fraud risks - 187
▸ Ms Margaret Balfour, Integrity Compliance Solutions, Australia

Innovative technologies to mitigate microbial food safety risks in fresh produce - 188
▸ Dr Sukhvinder Pal Singh, NSW Department of Primary Industries, Australia

A biocontrol option to control a food-borne pathogen, using bacteriophages to control Campylobacter in poultry - 189
▸ Dr Nalini Chinivasagam, Department of Agriculture and Fisheries, Queensland Government, Australia

Technologies that improve food safety and compliance - 190
▸ Mr Keith Gemmell, Safe Food Production QLD, Australia

Taking food safety to a new level – the application of genomics and big data - 191
▸ Prof David Burt, Office of the Deputy Vice-Chancellor (Research), The University of Queensland, Australia

18:00-20:00 Welcome reception and poster viewing

Alfred de Vries, Senior Program Officer for Animal Production
Bill & Melinda Gates Foundation

Alfred de Vries works at the Bill & Melinda Gates Foundation as Senior Program Officer for Animal Production. He leads the Foundation's efforts in R&D for Animal Production (genetics, reproduction, feed) aimed at increasing livestock productivity in Sub-Saharan Africa and South-Asia. Alfred has extensive experience in animal breeding across many geographies from his time at international breeding companies (CRV, Topigs Norsvin and PIC) . He had management positions in R&D, technical service and operations. He obtained his MSc and PhD degrees in Animal Sciences from Wageningen University and holds a Global Certificate in Management from INSEAD.

Tropical livestock for wealth in developing countries

The Agriculture Development program at the Gates Foundation strives to empower smallholder farmers with the tools and technologies they need to boost productivity, farm income and food quality. We partner with governments, local NGOs and businesses to give farmers better access to the markets, distribution networks, and the inputs they need.

Our investments in livestock started in 2012. The reasons for including livestock in the program were:

- 60% of people in extreme poverty own livestock
- livestock is often their most important asset
- 30-40% of Agricultural GDP
- important source for high quality nutrition
- opportunity to empower women
- enormous potential for yield improvement

Most animals in developing countries have health challenges and very low yields (~10 times lower compared to other countries), resulting in low farmer income, poor resource efficiency, high GHG emission intensity and high consumer prices.

The major constraints for higher productivity are in animal health, genetics and feed quality. To address these constraints, we have made investments in new technologies, products and delivery systems. Examples in genetics are genomic selection, sex sorted semen and artificial insemination for dairy cows and buffaloes. Important investments in poultry genetics are in the delivery of locally adapted chicken with 5-10 times more egg production. Other promising investments are in digital platforms that link farmers to the formal market as well as to financial services.

These technologies help to overcome barriers for successful farming in tropical countries, but much more innovation and investments are needed to give every farmer the chance of healthy and productive livestock.

Pamela Ronald, Founding Director of the Institute for Food and Agricultural Literacy
University of California, Davis

Pamela Ronald, is a Distinguished Professor, in the Dept. of Plant Pathology and the Genome Center, and Founding Director of the Institute for Food and Agricultural Literacy at the University of California, Davis. She also serves as a Key Scientist at the Joint Bioenergy Institute in Emeryville, CA.

Pamela studies rice genes that control resistance to disease and tolerance to environmental stress. Pamela and colleagues received the 2008 USDA National Research Initiative Discovery Award and the 2012 Tech Award for innovative use of technology to benefit humanity. In 2011, she was selected as one of the 100 most creative people in business by Fast Company Magazine. She is the recipient of the 2012 Louis Malassis International Scientific Prize for Agriculture and Food, a Guggenheim Fellowship, the National Association of Science Writers Science in Society Journalism Award, and the Fulbright-Tocqueville Distinguished Chair Award.

In 2014 she was named one of the world's most influential scientific minds by Thomson Reuters, in 2015 was selected by Scientific American as one of the world's 100 most influential people in biotechnology and in 2016 was named one of the 50 innovators and visionaries who will lead us toward a more sustainable future by Grist magazine. She is co-author, with her husband, Raoul Adamchak, an organic farmer, of Tomorrow's Table: Organic Farming, Genetics, and the Future of Food. Bill Gates calls the book "a fantastic piece of work" and "important for anyone that wants to learn about the science of seeds and challenges faced by farmers. In 2012, Tomorrow's Table was selected by The New Earth Archive as one of the 25 most powerful and influential books with the power to inspire college readers to change the world. Her 2015 TED talk has been viewed by more than 1.7 million people and translated into 26 languages.

Engineering crops for resistance to disease and tolerance to environmental stress

A major goal for food and agricultural research is to increase the resiliency of agricultural systems to adapt to rapid changes and extreme conditions. Prof. Ronald will describe how genetic approaches are being used to generate the next generation of crops that will help farmers thrive in these challenging conditions.

Her laboratory at UC Davis studies genes that control resistance to disease and tolerance of environmental stress. Together with her collaborators, she has engineered rice for resistance to disease and tolerance to flooding. Ronald will describe isolation of a rice immune receptor, its similarity to animal immune receptors and the microbial molecule that binds to and activates the rice immune receptor. She will describe isolation of the Sub1A gene and the development of a flood tolerant rice variety (known as 'Sub1' rice) produced by the International Rice Research Institute that was cultivated by over six million farmers in India and Bangladesh in 2017. Under submerged conditions, these 'Sub1' varieties have enhanced yield and can prevent total crop failure.

07:30-18:00	**Registration desk open**	Plaza Auditorium foyer, Plaza level, Brisbane Convention & Exhibition Centre, Grey Street, South Brisbane
08:30-10:00	**Plenary session 2**	
	Room	Plaza Auditorium
	Chair	Prof Robert Henry, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI)
08:30	**Keynote speaker**	**Tropical livestock for wealth in developing countries - 200** Mr Alfred de Vries, Senior Program Officer for Animal Production, Bill & Melinda Gates Foundation, USA
09:15	**Keynote speaker**	**Engineering crops for resistance to disease and tolerance to environmental stress - 201** Prof Pamela Ronald, Founding Director of the Institute for Food and Agricultural Literacy, University of California, Davis, USA
10:00	**Morning tea**	

10:30-12:30 Concurrent symposia session 4

FIELD CROPS
Room ▸ P7-8

4.1 ▸ From enzymes and cells to entire crops: Integrative approaches to redesigning photosynthesis for better yields

Chair ▸ Dr Robert Sharwood, ARC Centre of Excellence for Translational Photosynthesis, Australian National University, Australia

Recent advances in predicting stomatal behaviour - 202

▸ Prof Belinda Medlyn, Western Sydney University, Australia

Leaf 3D imaging and modelling to increase crop photosynthesis and water-use efficiency - 203

▸ Prof Margaret Barbour, The University of Sydney, Australia

Improving light use efficiency in C_4 plants by increasing electron transport rate - 204

▸ Dr Maria Ermakova, Australian National University, Australia

High-throughput phenotyping tools to test whether leaf-level photosynthesis traits are measurable at the crop level - 205

▸ Dr Barbara George-Jaeggli, ARC Centre of Excellence for Translational Photosynthesis; Queensland Alliance for Agriculture and Food Innovation (QAAFI), The University of Queensland, Australia

New tools can easily detect photosynthetic diversity in wheat - 206

▸ Dr Gonzalo Estavillo, Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia

Integrative leaf photosynthesis-to-crop yield modelling to help accelerate yield improvement - 207

▸ Dr Alex Wu, ARC Centre of Excellence for Translational Photosynthesis; Queensland Alliance for Agriculture and Food Innovation (QAAFI), The University of Queensland, Australia

ARC Centre of Excellence for translational photosynthesis

HORTICULTURE
Room ▸ P9

4.2 ▸ Digital horticulture

Chair ▸ Assoc Prof Jim Hanan, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia

Modelling orchard light environment - 208

▸ Dr Neil White, Department of Agriculture and Fisheries, Queensland Government, Australia

Using virtual plants to understand how fruit trees grow - 209

▸ Dr Inigo Auzmendi, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia

Robotic sensing and acting in protected cropping systems - 210

▸ Dr Chris Lehnert, Queensland University of Technology, Australia

Simulating bee pollination for horticultural applications - 211

▸ Assoc Prof Alan Dorin, Monash University, Australia

From real-time precision mapping to robotic actuation - examples from vegetable and tree crops - 212

▸ Prof Salah Sukkarieh, University of Sydney, Australia

The relevance of dominance to genomic selection in breeding clonally propagated plant species - 213

▸ Dr Christian Werner, The University of Edinburgh, UK

LIVESTOCK
Room ▸ P10

4.3 ▸ Understanding livestock microbiomes for health, welfare, and sustainability

Chair ▸ Assoc Prof Mary Fletcher, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia

Breeding low-emitting ruminants: Predicting methane from microbes - 214

▸ Dr Suzanne Rowe, AgResearch, New Zealand

Identifying plants that reduce methane production using an in vitro system - helping the challenge to become C neutral - 215

▸ Prof Phil Vercoe, University of Western Australia, Australia

A novel method to predict high-value traits, including methane emissions and feed efficiency, from rumen microbiome profiles - 216

▸ Dr Elizabeth Ross, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia

Moving from clouds to the microbiome – an animal health perspective - 217

▸ Assoc Prof Pat Blackall and Dr Lida Omaleki, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia

The genetics of rumen phage populations - 218

▸ Dr Rosalind Gilbert, Department of Agriculture and Fisheries, Queensland Government, Australia

Innate variability in animal performance and rumen microbiota across seasonal changes in a northern Australian grazing system - 219

▸ Dr Stuart Denman, Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia

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NUTRITION AND FOOD
Room ▸ P11

4.4 ▸ Wild crop relatives: The next frontier for crop improvement

Chairs ▸ Prof Wallace Cowling, The University of Western Australia
▸ Prof Ros Gleadow, Monash University, Australia

Diversity breeding program on common bean *(Phaseolus vulgaris L.)* targeting rapid cooking and iron and zinc biofortification - 220

▸ Dr Clare Mukankusi, International Center for Tropical Agriculture (CIAT), Uganda

Meta-analysis of genome-wide association studies for pre-breeding in agricultural crops - 221

▸ Dr Hans Daetwyler, Agriculture Victoria, Australia

The diverse functions of prussic acid in Australia's native sorghums: Lessons for domestication - 222

▸ Prof Ros Gleadow, Monash University, Australia

Potential use of Australian crop wild relatives in agriculture and food production - 223

▸ Prof Robert Henry, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia

Evolving gene banks – a continuously-improving genetic resource for crop breeders - 224

▸ Prof Wallace Cowling, The University of Western Australia, Australia

Challenges of collecting and preserving crop wild relatives - 225

▸ Dr Sally Norton, Australian Grains Genebank, Agriculture Victoria, Australia

AGFUTURES
Room ▸ Plaza Auditorium

4.5 ▸ Insect protein: Reducing waste and feeding the future

Chair ▸ Dr Peter James, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia

Black soldier flies for waste recycling and protein: Livestock for livestock - 226

▸ Dr Peter James, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia

Insect farming is here, but are we ready for it? - 227

▸ Ms Olympia Yarger, GoTerra, Australia

Insect nutrition, feeding and artificial diets - 228

Dr Elsje Pieterse, Stellenbosch University, South Africa

Nutritional value of black soldier fly from abattoir waste - 229

▸ Dr Luis Prada e Silva, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia

Impact of insect larvae on meat quality - 230

▸ Dr Louwrens Hoffman, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia

Enzymatic fractionation of protein, fat and chitin from *Hermetia illucens* (L.) (Diptera: Stratiomyidae) - 231

▸ Mr Michael J Woods, Stellenbosch University, South Africa

Queensland Government

12:30	**Lunch and poster presentations** Poster theme: Field Crops
13:30-15:30	**Concurrent symposia session 5**

FIELD CROPS
Room ▸ P7-8

5.1 ▸ Science, technology and process innovation in identification and management of emerging pest and disease threats
Chair ▸ Dr Harjeet Khanna, Sugar Research Australia, Australia

The confluence of drivers of change on the emergence, re-emergence and geographic redistribution of pathogens and pests - 232
▸ Dr James P Stack, Kansas State University, USA

Yellow Canopy Syndrome: A physiological disorder, not a disease - 233
▸ Dr Frikkie Botha, Sugar Research Australia, Australia

Current understanding of grain legume disorders in eastern Australia, and association to phytoplasma infection - 234
▸ Dr Murray Sharman, Department of Agriculture and Fisheries, Queensland Government, Australia

Understanding of dieback in grass-pastures across Queensland - 235
▸ Mr Stuart Buck, Department of Agriculture and Fisheries, Queensland Government, Australia

Smart surveillance to support plant biosecurity - 236
▸ Dr Brendan Rodoni, Agriculture Victoria, Australia

From colony collapse to complex syndromes: Pollinator health and disease transmission management in agricultural landscapes - 237
▸ Dr Vincent Doublet, University of Ulm Institute of Evolutionary Ecology and Conservation Genomics, Germany

HORTICULTURE
Room ▸ P9

5.2 ▸ Using precision information systems for advanced decision making in vegetables
Chair ▸ Dr Julie O'Halloran, Department of Agriculture and Fisheries, Queensland Government, Australia

Yield forecasting using remote sensing in vegetables - 238
▸ Dr Angelica Suarez Cadavid, University of New England, Australia

Using precision information technologies to understand crop variability - 239
▸ Ms Celia van Sprang, Department of Agriculture and Fisheries, Queensland Government, Australia

Application of precision agriculture techniques and variable rate technology in horticultural production in north Queensland - 240
▸ Mr Chris Monsour, Prospect Agriculture, Australia

Adoption of precision information technologies: The grower's journey - 241
Speaker to be confirmed

Drones for more vegetables - pathways to a commercial reality - 242
▸ Mr Nathanial Parker, Airborn Insight, Australia

Challenges and opportunities for PA adoption in vegetables - 243
▸ Dr Julie O'Halloran, Department of Agriculture and Fisheries, Queensland Government, Australia

LIVESTOCK
Room ▸ P10

5.3 ▸ Opportunities to improve efficiency of phosphorus in animal agriculture
Chairs ▸ Assoc Prof Mary Fletcher and Assoc Prof Stephen Anderson, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia

The outlook for global scarcity of phosphorus reserves for agriculture - 244
▸ Assoc Prof Brent Jacobs, University of Technology Sydney, Australia

Phosphorus in northern Australian soils supporting pastures or grain cropping - 245
▸ Prof Michael Bell, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia

Phosphorus in the nutrition of poultry and pigs in intensive production systems - 246
▸ Dr David Cadogan, Monogastric Technical Services, Feedworks, Australia

New-generation phytases for improved utilisation of diet phosphorus - 247
▸ Assoc Prof Robert Speight, Queensland University of Technology, Australia

Phosphorus nutrition in ruminants grazing tropical rangelands - 248
▸ Dr Rob Dixon, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia

Using digital soil mapping to estimate available soil phosphorus across Australian rangelands - 249
▸ Mr Peter Zund, Department of Environment and Science, Queensland Government, Australia

NUTRITION AND FOOD
Room ▸ P11

5.4 ▸ Provenance of meat
Chair ▸ Prof Louwrens Hoffman, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia

Provenance: The Australian flavour story for meat - 250
▸ Dr Heather Smyth, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia

Provenance of meat in Europe - 251
▸ Dr Sara Erasmus, Wageningen University, Netherlands

Provenance in sheep: The Karoo lamb story - 252
▸ Prof Louwrens Hoffman, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia

The effect of diet on meat provenance - 253
▸ Dr J Jeannine Marais, University of Stellenbosch, South Africa

What provenance means to the consumer - 254
▸ Ms Lisa Sharp, Meat and Livestock Australia, Australia

The role of Provenance of beef in a niche market: The OBE beef story - 255
▸ Andrew Blinco, OBE Organic Beef, Australia

AGFUTURES
Room ▸ Plaza Auditorium

5.5 ▸ Innovative climate products for improving risk management for the red meat industry in the tropics and subtropics
Chair ▸ Prof Roger Stone, University of Southern Queensland, Australia

Queensland's investment in managing drought, climate variability and adapting to climate change - 256
▸ Mr Vern Rudwick, Department of Agriculture and Fisheries, Queensland Government, Australia

Turning on farm data into valuable insights. How the opportunity is being addressed today, and where it is heading - 257
▸ Mr Jamie Azzopardi, The Weather Company, Australia

Prediction of northern Australian rainfall onset using the ACCESS-seasonal model - 258
▸ Dr Tim Cowan, University of Southern Queensland; Bureau of Meteorology, Australia

Mechanisms of multi-year wet/dry conditions over northern Australia - 259
▸ Dr Sharmila Sur, University of Southern Queensland; Bureau of Meteorology, Australia

The value of the Australian Drought Monitor to the cattle industry - 260
▸ Dr Christa Pudmenzky, University of Southern Queensland, Australia

Climate mates: Bridging the gap between scientists and producers - 261
▸ Dr Chelsea Jarvis, University of Southern Queensland, Australia

UNIVERSITY OF SOUTHERN QUEENSLAND

15:30 Afternoon tea

16:00-18:00 Concurrent symposia session 6

FIELD CROPS
Room ▸ P7-8

6.1 ▸ Stress physiology: Designing crops for a hotter and drier world - 262
Chair ▸ Prof Andrew Borrell, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia

Genotype and management adaptation of wheat to heat and drought in current and future climates -262
▸ Dr Karine Chenu, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia

Modelling heat and drought adaptation in crops - 263
▸ Dr Erik van Oosterom, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia

How do crops balance water supply and demand when water is limiting? - 264
▸ Prof Andrew Borrell, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia

The role of hydraulics in crop water use under drought - 265
▸ Dr Vincent Vadez, Institute for Development (IRD), France

Phenotyping the hidden half: Measuring roots from long hairs to deep cores - 266
▸ Dr Anton Wasson, Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia

Root responses of durum wheat ideotypes defined by contrasting root angles to localised phosphorus availability and dynamic soil profile moisture - 267
▸ Dr Frederik van der Bom, The University of Queensland, Australia

HORTICULTURE
Room ▸ P9

6.2 ▸ Horticultural tree genomics
Chair ▸ Dr Craig Hardner, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia

Advances in macadamia genomics - 268
▸ Dr Agnelo Furtado, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia

Breaking and flowering: The budding story of macadamia - 269
▸ Dr Francois Barbier, The University of Queensland, Australia

The avocado genome: An update - 270
▸ Dr Alice Hayward, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia

CRISPR kiwifruit – new opportunities for cultivation, breeding and research - 271
▸ Dr Erika Varkonyi-Gasic, The New Zealand Institute for Plant and Food Research Limited (PFR), New Zealand

Mango genomics: Drafting Kensington Pride - 272
▸ Dr David Innes, Department of Agriculture and Fisheries, Queensland Government, Australia

Genetics of almond - 273
▸ Dr Shashi Goonetilleke, The University of Adelaide, Australia

LIVESTOCK
Room ▸ P10

6.3 ▸ Growing human capital for tropical animal industries
Chair ▸ Dr Dianne Mayberry, Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia

Challenges of breaking into industry from early career perspective - 274
▸ Ms Rebecca Clapperton, Salisbury Plains Grazing, Australia

Opportunity and investment in the next generation of livestock scientists - 275
▸ Dr Shannon Landmark, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia

Career mobility to grow human capital in the tropical animal industries - 276
▸ Mr Peter Johnston, Department of Agriculture and Fisheries, Queensland Government, Australia

International perspective of future career opportunities in animal science - 277
▸ Dr Anna Okello, Australian Centre for International Agricultural Research (ACIAR), Australia

Mentoring and succession planning - talking from experience - 278
▸ Emeritus Prof Alan Bell, (retired) Cornell University, Australia

Building beef industry capacity in northern Australia - 279
▸ Mr Andrew Gatenby, Indigo Australia, Australia

AAAS Australian Association of Animal Sciences

NUTRITION AND FOOD
Room ▸ P11

6.4 ▸ Vertically integrated R&D platforms for underutilised and niche crops
Chair ▸ Assoc Prof Sean Mayes, University of Nottingham, UK; Crops for the Future, Malaysia

Advanced technologies to increase profitability of the Australian tea tree industry - 280
▸ Assoc Prof Tobias Kretzchmar, Southern Cross University, Australia

Australian native plant foods and their contribution to diet diversity - 281
▸ Assoc Prof Yasmina Sultanbawa, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), ARC Training Centre for Uniquely Australian Foods, Australia

Genetic improvement and application of genomic tools for Bambara groundnut improvement in West Africa - 282
▸ Dr Stephen Amoah, Crops Research Institute, Ghana

Knowledge representation and data management adding value to global niche crops - 283
▸ Prof Graham King, Southern Cross University, Australia

A systematic approach to defining nutritional quality of underutilised crops - 284
▸ Ms Razlin Azman Halimi, Southern Cross University, Australia

Orange capsicums and chillies as a potential source of dietary zeaxanthin, an important macular carotenoid for eye health - 285
▸ Ms Rimjhim Agarwal, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Centre for Nutrition and Food Sciences (CNAFS), Australia

Southern Cross Plant Science

Southern Cross University

AGFUTURES
Room ▸ Plaza Auditorium

6.5 ▸ Innovations in biosecurity
Chair ▸ Mr Malcolm Letts, Department of Agriculture and Fisheries, Queensland Government, Australia

The RD&E response to Queensland's Panama disease TR4 incursion - 286
▸ Mr Stewart Lindsay, Department of Agriculture and Fisheries, Queensland Government, Australia

Alternative diagnostic tools for White Spot Disease - 287
▸ Dr Beth Fowler, Department of Agriculture and Fisheries, Queensland Government, Australia

Start clean, stay clean - 288
▸ Mr Mark Whattham, Department of Agriculture and Water Resources, Australian Government, Australia

Future systems for traceability in the red meat supply chain - 289
▸ Ms Jo Quigley, Integrity Systems Company, Meat & Livestock Australia, Australia

New technologies for weed eradication - invasive plants have no place to hide when DNA is involved - 290
▸ Dr Laura Simmons, Department of Agriculture and Fisheries, Queensland Government, Australia

Collaborative planning and shared decision making in biosecurity emergency management - 291
▸ Dr Suzy Perry, Department of Agriculture and Fisheries, Queensland Government, Australia

Queensland Government

19:00-23:00 **TropAg2019 conference dinner** ▸ Plaza Ballroom, Plaza level, Brisbane Convention & Exhibition Centre

Mark Howden, Director of the Climate Change Institute
Australian National University

Professor Mark Howden is a Director of the Climate Change Institute at the Australian National University. He has been a major contributor to the Intergovernmental Panel on Climate Change (IPCC) since 1991, with roles in the Second, Third, Fourth, Fifth and now Sixth Assessment Reports, sharing the 2007 Nobel Peace Prize with other IPCC participants and Al Gore.

He is also an Honorary Professor at Melbourne University, a Vice Chair of the IPCC and a member of the Australian National Climate Science Advisory Committee. He is a former Chief Research Scientist at CSIRO Agriculture.

Professor Howden was on the US Federal Advisory Committee for the 3rd National Climate Assessment and contributes to several major national and international science and policy advisory bodies.

Professor Howden is an expert on how climate variability and climate change will impact on food production and food security and how to adapt to those impacts. He has also developed the national and international greenhouse gas inventories for the agricultural sector and assessed sustainable methods of reducing net greenhouse gas emissions from agriculture.

Professor Howden has worked on climate variability, climate change, innovation and adoption issues for more than 30 years in partnership with many industry, community and policy groups via both research and science-policy roles. Issues he has addressed include agriculture and food security, the natural resource base, ecosystems and biodiversity, energy, water and urban systems.

Professor Howden has authored more than 420 publications. The national and international greenhouse gas inventories he helped develop are a fundamental part of the Paris Agreement, helping inform sustainable ways to reduce emissions.

Climate change impacts, adaptation and mitigation for tropical agriculture

As climate change gains pace globally, many of the first and most severe impacts are falling on tropical regions. In particular these impacts are occurring in tropical agriculture and food systems with assessments of falling crop yields, decreases in the productivity of livestock and fisheries and increased climatic disruptions. This is likely to have already increased stresses in relation to food security and natural resource management, both on land and in the adjacent oceans. Unfortunately, increasingly negative changes appear to be likely, with projections of widespread and substantial negative future impacts of climate change on tropical agriculture. There are many potential adaptations to climate change, covering options ranging from incremental to transformational change each with different risk vs return profiles. Limits to adaptation and barriers to action are increasingly being seen as critical issues that will need a focus over the next decade. Similarly, integration of practices that reduce greenhouse gas emissions, enable effective adaptation to a variable and changing climate and enhance sustainable and stable agricultural production will likely become more important as climate change progresses. Furthermore, there will be a need to re-frame the science we do and the way we generate and deliver it. For example, science that is 1) demand-driven rather than supply driven, 2) that aligns with the values, needs or capability of users, 3) that is not presented as suitable for operational use when it is not. We can also better connect knowledge and action via co-learning that links closely the users and producers of climate information so as to address the correct time and spatial scales and climate variables and embed this information into the social and institutional processes through which decisions are made.

Derek Thompson, Senior Manager – Key Accounts & Business Development
Hitachi Australia Pty Ltd

Derrick Thompson is an internationally experienced manager with more than 25 years of global business success. His work at Hitachi Australia has seen the development and implementation of game-changing strategies and programs across the world.

Most recently those programs have involved introducing multiple Hitachi solutions and services into the Australian agribusiness sector. The solutions cover Internet of Things (IoT) deployment, innovative unmanned aerial vehicle (UAV) solutions for data capture, decision support systems and supply chain optimisation.

Derrick collaborates with organisations to develop strategies that succeed and position them for the next level of performance improvement.

Next Era Livestock Production

Data. Data. Data. Data is everywhere but producers are often overwhelmed by the sheer volume of raw data. What is needed is easily usable and valuable decision-making information. The ever-increasing range of digital tools to assist producers in the decision-making process with improved data based decision-making knowledge requires the use of numerous platforms that are not integrated, nor able to communicate with each other nor able to interpret and analyse information at a high level. This makes the use of such tools complicated, tedious and can at times be somewhat misleading, with the result of discouraging widespread adoption of data sourced technology. By integrating these tools, so that they are accessible through one Control Centre, such data driven digital transformation greatly improves the efficiency of using the available tools, results in increased adoption of data usage – all leading to increases in productivity and profitability, on farm and across the supply chain. Data is the next "Era in Livestock Production". Hitachi's presentation will look at a few case studies that demonstrate the value of intelligent use of data in daily farm operations.

08:00-17:00	**Registration desk open**	Plaza Auditorium foyer, Plaza level, Brisbane Convention & Exhibition Centre, Grey Street, South Brisbane
08:30-10:00	**Plenary session 3**	
	Room	Plaza Auditorium
	Chair	Dr Beth Woods, Director-General, Department of Agriculture and Fisheries, Queensland Government
08:30	**Keynote speaker**	**Climate change impacts, adaptation and mitigation for tropical agriculture - 300** Prof Mark Howden, Director of the Climate Change Institute, Australian National University, Australia
09:15	**Keynote speaker**	**Next era livestock production - 301** Mr Derrick Thompson, Senior Manager – Key Accounts & Business Development, Hitachi Australia Pty Ltd, Australia
10:00	**Morning tea**	

10:30-12:30 Concurrent symposia session 7

FIELD CROPS
Room ▸ P7-8

7.1 ▸ Modelling to improve crop adaptation in changing environments

Chair ▸ Dr Peter Thorburn, Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia

Cropping systems modelling: Past, present and future - 302
▸ Dr Peter Torburn, Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia

Integrating crop modelling, physiology, genetics and breeding to aid crop improvement for changing environments - 303
▸ Dr Karine Chenu, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia

Drivers of phosphorus efficiency in tropical and subtropical cropping systems - 304
▸ Ms Bianca Das, Commonwealth Scientific and Industrial Research Organisation (CSIRO); The University of Queensland, The School of Agriculture and Food Sciences, Australia

Improving crop adaptation through improved phenology prediction: A case study with chickpea - 305
▸ Dr Yash Chauhan, Department of Agriculture and Fisheries, Queensland Government, Australia

Learning through modelling to help on farm decisions in North Queensland - 306
▸ Dr Keith Pembleton, University of Southern Queensland, Australia

From fields to farms: Informing the trade-offs across the multiple functions of agriculture - 307
▸ Prof Daniel Rodriguez, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia

HORTICULTURE
Room ▸ P9

7.2 ▸ Nano-containers to deliver plant genetic cargo

Chair ▸ Prof Neena Mitter, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia
▸ Prof David Cahill, Deakin University, Australia

Nanoplatforms for large and small molecule delivery to plant cells - 308
▸ Prof David Cahill, Deakin University, Australia

Nanomaterials enable delivery of genetic material without transgene integration in mature plants - 309
▸ Asst Prof Markita Landry, University of California-Berkeley, USA

Novel nanoparticle platforms for chloroplast-targeted transgene delivery and expression across varied plant systems - 310
▸ Assoc Prof Seonyeong Kwak, Seoul National University, South Korea

Encapsidation of heterologous nucleic acids in virus-like particles: The potential for plant protection - 311
▸ Dr Frank Sainsbury, Griffith University, Australia

Clay nanoparticles facilitate delivery of antiviral RNA for crop protection - 312
▸ Prof Zhiping (Gordon) Xu, The University of Queensland, Australian Institute for Bioengineering and Nanotechnology (AIBN), Australia

A perspective on risks associated with RNAi-based biopesticides - 313
▸ Mr Stephen Fletcher, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia

LIVESTOCK
Room ▸ P10

7.3 ▸ The highs and lows of maternal nutrition in beef cattle

Chair ▸ Dr David McNeill, The University of Queensland, Australia

Pregnancy nutrition affects calf survival in the tropics - 314
▸ Dr Geoffry Fordyce, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia

Maximising reproduction under extensive grazing conditions, regardless of rainfall - 315
▸ Dr Kylie Schooley, The University of Queensland, Australia

Nutritional programming of beef heifers - 316
▸ Dr Tryon Wickersham, Texas A&M, USA

Prepartum supplementation to improve transfer of passive immunity and growth - 317
▸ Dr Luis Prada e Silva, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia

Risk factors for dystocia in cattle - 318
▸ Assoc Prof Scott Norman, Charles Sturt University, Australia

Strategic supplementation enhances rumen microbiome efficiency in pregnant tropical beef cows - 319
▸ Dr Christopher S McSweeney, Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia

NUTRITION AND FOOD
Room ▸ P11

7.4 ▸ Research for innovative rice-based food systems and nutrition amid climate change

Chair ▸ Antonio Costa de Oliveira, Federal University of Pelotas, Brazil

Genetics and metabolomics of aroma in rice - 320
▸ Prof Melissa Fitzgerald, The University of Queensland, Australia

SNPs linked to key traits in hybrids between African and Asian rice - 321
▸ Ms Hayba Badro, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia

Introgression of large grain size from Australian wild rice and its agronomical importance - 322
▸ Mr Ryuji Ishikawa, Hirosaki University, Japan

Iron responsive genes in rice: The multiple roles of WRKY factors - 323
▸ Prof Antonio Costa de Oliveira, Federal University of Pelotas, Brazil

Rice biofortification – progress and challenges in improving the nutritional value of rice - 324
▸ Dr Russell Reinke, International Livestock Research Institute (ILRI), Philippines

Meeting the consumer preference of high quality rice grown in a tropical environment - 325
▸ Mr Russell Ford, SunRice, Australia

AGFUTURES
Room ▸ Plaza Auditorium

7.5 ▸ Future horticulture production systems

Chairs ▸ Dr Lynne McIntyre and Dr Peyman Moghadam, Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia

Why AgTech has disappointed us so far, why we need it, and how we can improve adoption rates - 326
▸ Mr Matthew Fealy, Blue Sky Produce, Australia

The Small Trees High Productivity Initiative: Principles and practice in high-density orchard design - 327
▸ Ms Helen Hofman, Department of Agriculture and Fisheries, Queensland Government, Australia

Intelligent systems for commercial application in perennial horticulture - 328
▸ Dr Everard Edwards and Dr Peyman Moghadam, Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia

Increasing the diversity of crops that can be grown in urban and vertical farms - 329
▸ Dr Cathryn O'Sullivan, Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia

Robots and autonomous technology in orchards – the future is here, so what does it really look like? - 330
▸ Mr Andrew Bate, SwarmFarm Robotics, Australia

Future of horticulture production systems from an RDC perspective - 331
▸ Mr Byron de Kock, Hort Innovation, Australia

12:30 **Lunch and poster presentations**
Poster themes: Horticulture and Nutrition and Food

13:30-15:30 **Concurrent symposia session 8**

FIELD CROPS
Room ▸ P7-8

8.1 ▸ AgTech - feeding the future
Chair ▸ Prof Sagadevan Mundree, Queensland University of Technology, Australia

Expedited crop improvement through deep learning and editing - 332
▸ Dr Tengfang Huang, Elo Life Systems, USA

Harnessing asexual seed formation to preserve hybrid vigour and complex yield traits - 335
▸ Prof Anna Koltunow, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia

Integrating gene editing techniques into modern cereal breeding - 336
▸ Prof Ian Godwin, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia

In-plant insect-proofing by trans-kingdom RNAi - 337
▸ Dr Julia Bally, Queensland University of Technology, Australia

▸ Speaker to be confirmed

▸ Speaker to be confirmed

HORTICULTURE
Room ▸ P9

8.2 ▸ Strengthening value chains in tropical Australia with protected cropping systems
Chair ▸ Dr Elio Jovicich, Department of Agriculture and Fisheries, Queensland Government, Australia

Benefits and challenges for expanding protected cropping in the Australian tropics - 338
▸ Dr Elio Jovicich, Department of Agriculture and Fisheries, Queensland Government, Australia

Automated retractable greenhouses and cooling-houses in mild to hot climates - 339
▸ Mr Bede Miller, Cravo Australia, Australia

Our experiences testing protected cropping where nobody uses it - 340
▸ Josh, Chris and Ross Pirrone, Pirrone Brothers Produce, Australia

How can protected cropping ensure an export supply of high quality melons in the tropics? - 341
▸ Ms Heidi Wittl, Department of Agriculture and Fisheries, Queensland Government, Australia

6 marketing steps to ensure profit - 342
▸ Mr Mike Evans, Fresh Partners Marketing, Australia

Innovative control systems for protected cropping systems in the tropics - 343
▸ Mr Odin Franssen, Powerplants Australia, Australia

HORTICULTURE
Room ▸ P10

8.3 ▸ Overcoming barriers to growth in horticulture
Chairs ▸ Assoc Prof Andrew Geering and Assoc Prof Femi Akinsanmi, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia

Overcoming barriers to growth in horticulture - 344
▸ Ms Marie Piccone, Manbulloo Ltd, Australia

The future of avocado - 345
▸ Dr Antony Allen, The Avolution, Australia

Deploying new technologies to secure the banana industry - 346
▸ Dr Rosie Godwin, Australian Banana Growers' Council, Australia

Increasing macadamia production through thick and thin - 347
▸ Mr Robbie Commens, 2 Tonnes Enterprise, Australia

Innovation in plant protection in the citrus industry - 348
▸ Dr Andrew Miles, 2PH Farms, Australia

Cross sectoral biosecurity RD&E to protect the Australian horticulture industry - 349
▸ Dr Jo Luck, Hort Innovation, Australia

AGFUTURES
Room ▸ P11

8.4 ▸ Women in Agribusiness
Chair ▸ Tamanna Monem, Women in Business Queensland Chapter, Australia India Business Council, Australia

What are key attributes to be successful agribusiness supply chain in a highly competitive market such as India?
▸ Dr Usha Zehr, Maharashtra Hybrid Seeds Company Private Limited (MAHYCO), India

How research and collaboration help companies in Australia to be competitive in accessing USA supply chain
▸ Prof Pamela Ronald, Founding Director of the Institute for Food and Agricultural Literacy, University of California, Davis, USA

Industry and Academia engagement to deliver a competitive world class agribusiness industry
▸ Prof Bronwyn Harch, Deputy Vice Chancellor - Research, The University of Queensland, Australia

Skills development in agribusiness
▸ Prof Neena Mitter, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia

Panel discussion

AGFUTURES
Room ▸ Plaza Auditorium

8.5 ▸ Innovations in waste management and recycling in Queensland agriculture

The role of science in understanding the multidimensional challenges of agrifood waste - 350
▸ Prof Paul Bertsch, Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia

Fighting food and packaging waste through the agricultural supply chain - 351
▸ Mr Ben Baldwin, Department of Agriculture and Fisheries, Queensland Government, Australia

Creating opportunities for resource recovery in the Queensland agriculture sector - 352
▸ Mr Pravin Menon, Department of Environment and Science, Queensland Government, Australia

Transforming food waste into higher value products - 353
▸ Dr Paul Luckman, Fight Food Waste Cooperative Research Centre, Australia

What is needed to make the Circular Economy for Organics a reality? - 354
▸ Mr Johannes Biala, The University of Queensland, Centre for Recycling of Organic Waste and Nutrients, Australia

AATLIS Precinct: Helping navigate pathways to sustainable solutions through digital technology adoption - 355
▸ Mr Thomas Hall, FKG Group, Australia

15:30 **Afternoon tea**

Birgitte Skadhauge, Vice President, Adj. Prof.
Carlsberg Research Laboratory

Birgitte Skadhauge completed her studies (M. Sc degree) at the Royal and Veterinary Agricultural University, Copenhagen in 1992. This was followed by a Ph.D. degree in biochemistry and genetics at the Carlsberg Laboratory in Copenhagen (1993-1996). Since 2003 she has been responsible for Carlsberg Raw Material Research, and since 2011 Director for Applied Research activities in Carlsberg, including Raw materials, Yeast, Ingredients and Brewing Technology and sustainability in 2012 she was appointed Honorary Adjunct Professor at Århus University. Since 2014 she held the position as Vice President for Carlsberg Research Laboratory and Baltika Research and she is the Founder of Traitomics.

She is a member of several scientific advisory boards and committees, appointed member of e.g. 'Danish Science and Innovation Political Counsel' (Ministry for Science and Innovation); Danish Industry, Committee for Research, Innovation and Education; Board Member for Danish Malting Group A/S; DMG (2008-2016), Denmark and DMG Poland (2008-2016), Board member in Sejet Plant Breeding I/S, Board member in "Association for Danish Variety Owners", Board member in Scandinavian Brewing School, Board member in Carlsberg's Bequest for Brewer J.C. Jacobsen, advisory board member at DTU, Bioengineering, Board member in Secobra Recherche (France).

Advancing brewing science

Cereals were some of the first crops to be domesticated by humans. Today, cereals represent the biggest starch source in the world and are the primary raw material for food and feed. Modern breeding techniques produced high yielding varieties, but were based on a limited genetic background, which resulted in significant loss of genetic diversity. This could potentially result in major challenges due to recent climate changes and altered growing conditions. It is estimated that an increased global temperature will lead to dramatic loss in plant productivity in many parts of the world.

The barley breeding effort of the Carlsberg Research Laboratory combines decades of expertise to provide new varieties with unique quality and sustainability traits such as e.g. drought tolerance. Combining traditional breeding, genome data and a new method for screening genetics variants, we have radically shortened the development time of varieties with new traits. This has already resulted in the identification of several hundred genetic variants related to climate, sustainability, productivity and brewing quality. This accelerated approach can easily be applied for the development of other crops in both developing and matured markets around the globe, and help securing a sustainable supply of food and other agricultural products.

15:50 - 17:00	Plenary session 4	
	Room	Plaza Auditorium
	Chair	Prof Glen Fox, UC Davis We invite you to share a beer whilst hearing about the science behind a good brew
15:50	**Keynote speaker**	**Advancing brewing science - 356** Ms Birgitte Skadhauge, Vice President, Carlsberg Research Laboratory, Carlsberg Group, Denmark
16:25	**Panel discussion** **Facilitator** **Panelists**	**Towards 2050: Shaping the science of tomorrow** Mr Peter Lewis, Way with Words Prof Robert Henry, Dr Beth Woods, Prof Mike Gidley, Prof Ian Godwin, Prof Neena Mitter
17:00	**Conference close**	Prof Robert Henry, The University of Queensland, Queensland Alliance for Agriculture and Food Innovation (QAAFI), Australia