

27 November 2015

The Hon. Teresa Gambaro
Chair
Joint Standing Committee on Foreign Affairs, Defence and Trade
PO Box 6021
Parliament House
Canberra ACT 2600
By email: jscfadt@aph.gov.au

Dear Ms Gambaro

Inquiry into the role of development partnerships in agriculture and agribusiness in promoting prosperity, reducing poverty and enhancing stability in the Indo-Pacific region

Thank you for the opportunity to make a submission to the inquiry you are leading into the role of development partnerships in promoting prosperity, reducing poverty and enhancing stability in the Indo-Pacific region.

The University of Sydney has a proud and long history (more than 100 years) of contributing to economic development in Australia, the Indo-Pacific region and beyond, through our agriculture, veterinary science, medicine and business disciplines, as well as through our work in many other auxiliary fields. Our longstanding capacity building activities have served to improve food security and sustainability in a large number of developing countries with significant societal and economic impact.

The challenges ahead for food security and political stability in the Indo-Pacific are immense. Competing pressures on soil, water, nutrients, and space for agricultural production are only expected to increase as a result of population growth, economic development, and climate and environmental change. Achieving an optimal and sustainable level of food safety and animal welfare will not only require the application of new knowledge and technology, but innovation in partnership models and more effective collaboration between agribusiness, governments and universities.

Feeding the world is big business. As a large exporter of high quality, safe and nutritious food to the Indo-Pacific region Australia has great opportunities and responsibilities to support economic development. At the University of Sydney, we are grappling with one of the greatest concerns of our time: *how to provide sufficient nutritious, affordable food for an ever growing population in an ethical and sustainable manner?* Over-and-under-nutrition are endemic problems not only in our immediate region but across the globe, and agribusiness can help solve some of these problems. Close collaboration and partnership between the public and private sectors is essential in this endeavour.

In recognition of these trends and the scale of the challenges, we are pursuing strategies to strengthen our disciplinary excellence, sustain and build expertise, and encourage interdisciplinary approaches. For example, our [Sydney Southeast Asia Centre \(SSEAC\)](#) oversees our substantial expertise relevant to Southeast Asia, including the Indo-Pacific countries of Indonesia and Timor-Leste, and coordinates our extensive engagement with these countries. SSEAC brings together over 270 academics from across the University working in five areas of thematic strength and relevance to the region: economic and social development; environment and resources; health; heritage and the arts; and state and society.

The Centre supports academics working on projects relevant to the region and generates high impact multidisciplinary initiatives that address the short and longer term strategic challenges faced by countries and communities in Southeast Asia. In collaboration with the University's faculties and central portfolios, SSEAC promotes the University's and Australia's engagement in the region by partnering strategically with governments, think tanks, non-governmental organisations and the private sector.

We currently have 35 academics located across 10 faculties with a research interest in Timor-Leste, and 97 academics spread over 12 faculties with a research interest in Indonesia. Several of our staff are involved in projects that contribute to Australia's overall development presence in the Indo-Pacific. In Indonesia and Timor-Leste, many of our relevant projects are concentrated in SSEAC's economic and social development cluster. The University also has a number of current international development projects across mainland Southeast Asia, including in Myanmar, Laos, Cambodia and Vietnam.

Given that Australia has both a security and humanitarian interest in ensuring political, social and economic stability in the region, projects aimed at building skills, economic independence, and raising education standards will no doubt be in our national interest. Moreover, partnerships that deliver improved agricultural capacity and processes, and strengthen nutrition security, will contribute to economic development in the region, ensuring that sustainability is a core consideration in future economic growth.

In our attached submission we have provided one case study relevant to each term of reference, in order to demonstrate how our innovative approach across many fields and countries is serving to promote prosperity, reduce poverty and enhance stability in the region. These case studies are:

- ToR 1 Improving nutrition security and livelihoods in Myanmar**, an interdisciplinary project led by researchers in the Faculty of Science and the Sydney School of Public Health;
- ToR 2 Enhancing food security and economic growth in South Asia through genetic improvements to key food crops**, led by researchers in the Plant Breeding Institute, Faculty of Agriculture and Environment;
- ToR 3 Village poultry in Timor-Leste**, an interdisciplinary and multi-agency project led by researchers in our Faculty of Veterinary Science;
- ToR 4 Public-private partnerships in cocoa farming in Southeast Asia**, led by researchers in our Faculty of Agriculture and Environment; and
- ToR 5 Creating new research and education hubs to nurture innovation and cross-sector collaborations**, led by researchers in our Charles Perkins Centre for Obesity, Diabetes and Cardiovascular Disease and the Marie Bashir Institute for Infectious Diseases and Biosecurity.

For each term of reference we have also listed some other relevant projects we currently have underway, and provided the names of the key faculties, centres and individual experts who could be contacted for further information as required. If it would assist the Committee, we would be delighted to make some of our experts available to discuss the key factors for success and failure of development projects, and the key actions the Australian Government could take to further improve outcomes. If the Committee requires anything further from the University of Sydney, please do not hesitate to contact Mr Tim Payne, Director, Higher Education Policy and Projects in my office in the first instance (tim.payne@sydney.edu.au, 02 9351 4750).

Yours sincerely

(Signature removed for electronic distribution)

Professor Stephen Garton
Acting Vice-Chancellor

Attachment University of Sydney specific comments relevant to the Inquiry's terms of reference

University of Sydney submission to the Joint Standing Committee on Foreign Affairs, Defence and Trade's inquiry into the role of development partnerships in agriculture and agribusiness in promoting prosperity, reducing poverty and enhancing stability in the Indo-Pacific region, November 2015

Recommendations

1. Ensure that Commonwealth funding for agriculture development programs provides medium to long-term certainty for multi-sectoral and interdisciplinary research partnerships.
2. Provide catalytic funding that enables researchers to engage actively with community and private sector groups to accelerate the adoption of tailored and feasible technologies and innovations.
3. Use an integrated multi-sectoral approach that is gender and nutrition sensitive to improve women's economic empowerment.
4. Ensure that the human dimension of agriculture and agribusiness is recognised and used to support innovative, self-sustaining initiatives that strengthen and grow local economies.
5. Use data reported routinely to the Australian Government by universities and other organisations to develop information technology solutions that enable local and international government and non-governmental organisations to identify and access relevant expertise.

Case study responses to the terms of reference

ToR 1 - Australia's contribution and achievements to date in catalysing sustainable economic growth, improving livelihoods and strengthening food and nutrition security through partnerships in the agriculture and food sector in developing countries in the region.

Case study

Improving nutrition security and livelihoods in Myanmar

An interdisciplinary research team led by the University of Sydney is at the forefront of the global effort to meet the United Nations Millennium Development Goals (MDGs) and Sustainable Development Goals (SDGs) on hunger in Myanmar.

Undernourishment is a major global burden on economic growth and a key trigger of political instability. Myanmar is at a key moment of political and economic transformation, and Australia has strong national interests in supporting the country's stability as it moves towards a more democratic and liberal future. This project, a world first, will generate explanations of the underlying causes of undernourishment in Myanmar, thereby assisting national policy and international efforts to address this problem.

Global progress against malnutrition has been too slow for the Millennium Development Goals on hunger to be met. International research has proposed that these failures are due to an increasing misalignment in the livelihood options available to poor households and their traditional channels for ensuring food and

nutrition security. This argument is highly influential in international development research, underpinning calls for nutrition-sensitive development interventions. The aim of this ARC-funded project, which commenced in February 2015, is to test the proposition using original survey data collected from 1,600 households in rural Myanmar.

As the first systematic testing of the agriculture-disconnect in rural Myanmar, this project has significance at two levels. First, it responds to international research priorities for one of the world's most pressing problems. Globally an estimated 843 million people are undernourished.¹ In the case of Myanmar, the project responds to a mismatch in its status as a major exporter of food staples, and the high levels of under-nutrition suffered by its population. To date, evidence suggests that recent economic growth has been unevenly distributed across society, and large sections, particularly landless rural residents, are not reaping any of the benefits.

The project has four key aims which will have both policy and societal impact when achieved. The first aim is to address current knowledge gaps about food and nutrition insecurity in rural Myanmar, focusing on the Dry Zone (Magway Region), the Delta (Ayeyarwaddy Region), the eastern agricultural plateau resource-boom region (Shan State) and the mountainous precarious livelihoods region (Chin State). The project's second aim is to analyse nutrition outcomes against household socio-economic indicators. The third aim of the project is to understand livelihood decision-making, and in particular the role of women. Finally, we will use our findings to inform global theory, and participate in Myanmar policy forums.

Impact will be achieved through our close partnership with the Government of Myanmar (GoM). Our formal agreements with the GoM will ensure access to regional field sites and collaboration with international donor agencies. As the first major international research project to explicitly address the nutrition-livelihoods nexus in rural Myanmar, this project has great potential to help the country achieve the newly adopted SGDs, particular the five targets set for SDG 2 – Zero Hunger, and attract international attention for the contribution Australia makes to help people improve their livelihoods and overcome poverty.

Other relevant current projects

- Institutions for Food Security: Global Insights from Rural India (ARC Discovery Project 2010-14)
- Rural adjustment or structural transformation? Discovering the destinations of exiting farm families (ARC Linkage Project 2010-15)
- Farmers of the Future: Challenges emerging from a Feminised Agriculture in India (ARC Discovery Project 2014-16)
- Village-based biosecurity for livestock disease risk management in Cambodia (ACIAR)
- Enhancing trans-boundary livestock disease risk management for poverty reduction in Lao PDR (ACIAR)
- Development of a bio-secure market-driven beef production system in Lao PDR (ACIAR)
- Improving fish health management and production protocols in marine finfish aquaculture in Indonesia and Australia (ACIAR)

Relevant faculties, centres and experts

- Faculty of Science
- Faculty of Agriculture and Environment
- Faculty of Veterinary Science
- Sydney Medical School

- Charles Perkins Centre
- Sydney Southeast Asia Centre
- Sydney Environment Institute
- Menzies Centre for Health Policy

¹ FAO (2013) *The State of Food and Agriculture*, FAO, Rome.

- Associate Professor Bill Pritchard, School of Geosciences, Faculty of Science
- Professor Michael Dibley, Sydney School of Public Health, Sydney Medical School
- Associate Professor Robyn Alders AO, Principal Research Fellow, Faculty of Veterinary Science and Healthy Food Systems Node Lead, Charles Perkins Centre
- Associate Professor Russell Bush, Livestock Production, Faculty of Veterinary Science
- Associate Professor Jenny-Ann Toribio, Epidemiology and Veterinary Public Health, Faculty of Veterinary Science
- Professor Richard Whittington, Farm Animal Health and Production, Faculty of Veterinary Science

External collaborators

- University of Public Health, Yangon, Myanmar
- University of Community Health, Magway, Myanmar
- Department of Medical Research, Ministry of Health, Government of Myanmar
- The University of Western Australia

ToR 2 - The particular roles of agricultural innovation in supporting agricultural development and inclusive economic growth.

Case study

Enhancing food security and economic growth in South Asia through genetic improvements to key food crops

Grain research led by the University of Sydney is central to the global effort to develop disease-resistant and drought-tolerant strains of wheat, barley, oats and other cereal crops.

Estimates put potential losses from wheat rust diseases in Australia alone at more than one and a half billion dollars each year, while providing sustainable food yields to an ever increasing global population is one of the greatest challenges facing humanity.

Cereal grains are grown in greater quantities and provide more food energy worldwide than any other crops. Today, roughly half of the world's cropland is devoted to growing cereals, and global dependence on cereal grains is only expected to increase. Australia is the second largest global exporter of wheat, and continuing to meet this demand will be critical to national and global food security.

New techniques are needed to drive the genetic improvements that will provide increased crop growth without damaging the environment. Plant breeding provides the foundation of sustainable, efficient and high quality food production, via production of improved genotypes for human as well as animal consumption.

To ensure that the gains we have enjoyed in crop production continue well into the future, our researchers are focused on developing the genetic platform from which plant breeders can more rapidly synthesise new cultivars, as well as equipping the next generation of scientists with the skills and expertise needed to conduct this work. For example, our Faculty of Agriculture and Environment's Plant Breeding Institute based at Cobbitty NSW has targeted two primary groups of genetic traits to improve crop performance: those that influence resistance to pests and diseases; and those that control crop responses to moisture deficit and elevated temperatures.

This work has had an especially strong impact on the innovation in molecular marker technologies for faster wheat breeding in South Asia. Our projects there are part of the ongoing Indo-Australian program on Marker Assisted Wheat Breeding and provide a conduit between the developers of molecular marker technology and Indian wheat breeders. They also link other components, including water-logging, improved root structure, rust resistance and grain quality.

Breeders in India and Australia provide a hub for the practical integration of molecular technology and wheat breeding, and the management of associated data. We have worked with the wheat breeding programs at the Directorate of Wheat Research (DWR) in Karnal and the Punjab Agricultural University (PAU) at Ludhiana in India to help implement marker assisted breeding and markers for many diseases. As a result, plant structure, environmental suitability and quality characteristics are now used routinely. Lines selected using molecular markers are in regional yield trials across India and a large amount of germplasm with unique combinations of rust resistance genes from Indo-Australian crosses have been developed.

Projects like these have had a strong and lasting impact on food security in India as well as benefitting the Australian wheat growers through the introduction of high yielding wheat hybrids. The projects have also developed crop cultivars that use water more efficiently, producing more wheat with less water. Future interventions will seek to find drought resistant wheat and breed this in to commercial cultivars to achieve significant gains in productivity.

The potential for long-term benefits are substantial: raised income levels and more inclusive and sustained economic growth; better use of scarce water resources; and improvements to the sustainability of local farming systems.

Other relevant current projects

- Developing Zn-dense, high-yielding wheat by molecular marker technology (ARC Linkage Projects)
- Exploitation of international grains in Australia: coordinated importation, quarantine & evaluation, data management & communication (Grains Research and Development Corporation)
- Evaluation of wheat germplasm derived from Indian materials for specific traits of importance to the Australian cropping environment (Grains Research and Development Corporation)
- Exploitation of Inter-specific Biodiversity for Wheat Improvement (Biotechnology and Biological Sciences Research Council, UK)
- Durable Rust Resistance in Wheat (Bill and Melinda Gates Foundation)
- Capacity building in biotic stress tolerance in wheat (Bill and Melinda Gates Foundation)

Relevant faculties, centres and experts

- Faculty of Agriculture and Environment
- Plant Breeding Institute
- IA Watson Grains Research Centre

- Professor Richard Trethowan, Director, Director, IA Watson Grains Research Centre, Narrabri
- Professor Peter Sharp, Director, Plant Breeding Institute, Cobbitty
- Professor Robert Park, Judith & David Coffey, Chair in Sustainable Agriculture and Director of Cereal Rust Research, Plant Breeding Institute, Cobbitty

External collaborators

- Australian Centre for International Agricultural Research (ACIAR)
- Borlaug Global Rust Initiative (BGRI)
- Commonwealth Scientific and Industrial Research Organisation (CSIRO)
- Grains Research and Development Corporation (GRDC)
- International Maize and Wheat Improvement Centre (CIMMYT)
- International Center for Agricultural Research in the Dry Areas (ICARDA)
- Directorate of Wheat Research (DWR), Karnal, India
- Punjab Agricultural University (PAU), Ludhiana, India

ToR 3 - Actions and approaches to agricultural development in the region that would promote gender equity, women's economic empowerment and health.

Case study

Village poultry in Timor-Leste

University of Sydney researchers are empowering women, improving nutrition, building economic opportunity and supporting educational outcomes in Timor-Leste through gender sensitive village poultry development programs.

In Timor-Leste approximately 50% of children suffer from stunting (growth and neurodevelopmental failure) due to malnutrition. More than 30% of women suffer from chronic energy deficiency, and this is reflected in the high maternal mortality rate. The World Bank estimates that 11% of gross national product in developing countries is lost annually due to malnutrition.

Village poultry are frequently the only livestock under the control of women in Timor-Leste and other developing countries. If we can improve the health and productivity of village poultry we can make major contribution to ensuring that households, at all times, have physical and economic access to adequate amounts of nutritious, safe, and culturally appropriate foods.

Evidence shows that empowered women who can make decisions on how household incomes are allocated, spend more money on nutritious food, health care and education. Women's work can lead to increased income, which may be spent on food, resulting in improved nutrition outcomes. According to the Food and Agricultural Organization of the United Nations (FAO), an increase in women's income of \$10 achieves the same improvements to children's nutrition and health as an increase in a man's income of \$110².

Much of our work on village poultry has been supported by the Australia Government including several research projects funded by the Australian Centre for International Agricultural Research (ACIAR). The model of cross-sectoral collaboration we have used incorporating producers and traders, as well as government and local and international research institutions, has been critical to the success of our village poultry program. It has allowed us to tailor our approach for each community to identify the strategies that work best for the long-term and that can gradually be handed over to the villagers to maintain.

Since November 2014 alone, our multidisciplinary, multiagency, gender and nutrition-sensitive approach to improving the health of village poultry in Timor-Leste has increased the number of households raising poultry by 13% in communities vaccinating against Newcastle Disease (ND). The emphasis is now on increasing the consumption of animal source food by mothers and children, and on the decision-making power of women. The involvement of women in the community-based ND vaccination campaigns and as community assistants in the research is leading to important changes in attitudes among men towards women and their role in society.

Our work also has a strong focus on capacity building by incorporating graduate students into our research projects. Many of our students benefit from Australian Government funding (either through the Australian Postgraduate Award scheme or Endeavour Australia Awards) and this funding support is vital. We work in direct collaboration with partner frontline Ministries and regional economic communities as well as regional and international research organisations and donors.

Other relevant current projects

- Developing a model for understanding and promoting dietary diversity in Zambia (ACIAR 2014)
- Strengthening food and nutrition security through family poultry and crop integration in Tanzania and Zambia (ACIAR 2012)

² FAO infographic: Where does a gender gap in agriculture exist? <http://www.fao.org/gender/infographic/en/>

Relevant faculties, centres and experts

- Faculty of Veterinary Science
- Faculty of Agriculture and Environment
- Sydney Medical School

- Associate Professor Robyn Alders, AO, Principal Research Fellow, Faculty of Veterinary Science and Healthy Food Systems Node Lead, Charles Perkins Centre
- Associate Professor Jenny-Ann Toribio, Epidemiology and Veterinary Public Health, Faculty of Veterinary Science
- Dr Brigitte Bagnol, Adjunct Senior Lecturer, Social and Medical Anthropology, Faculty of Veterinary Science
- Associate Professor Robyn McConchie, Head, Department of Plant and Food Sciences, Faculty of Agriculture and Environment
- Associate Professor Mu Li, Sydney School of Public Health, Sydney Medical School

External collaborators

- KYEEMA Foundation
- Royal Veterinary College, London
- Sokoine University of Agriculture, Tanzania
- University of Dar es Salaam, Tanzania
- Muhimbili University of Health and Allied Sciences, Tanzania
- Tanzania Veterinary Laboratory Agency
- Tanzania Food and Nutrition Centre
- Timor-Leste Ministry of Agriculture and Fisheries
- Timor-Leste Ministry of Health
- National University of Timor Lorosae
- University of Zambia
- Zambian Ministry of Fisheries and Livestock
- Zambian National Commission for Food and Nutrition

ToR 4 - The current and potential role of the private sector, including small developing-country entrepreneurs and larger Australian and international businesses, in driving inclusive and sustainable development in Indo-Pacific agriculture and food value chains.

Case study

Public-private partnerships in cocoa farming in Southeast Asia

Our researchers are working with private sector and industry partners in Indonesia and Papua New Guinea to improve the livelihoods of cocoa farmers.

Cocoa is the main source of income for an estimated 400,000 farmers in Sulawesi and a further 400,000 in Papua New Guinea. Global demand is strong, but neither region has the infrastructure or support for farmers facing threats, particularly from pests, diseases and climate uncertainty.

ACIAR-funded cocoa projects in Indonesia and Papua New Guinea have identified key constraints to improving smallholder cocoa production and developed new scientific knowledge to strengthen the supply chain. Significant productivity and quality improvements have been achieved through better understanding and management of pest and disease problems.

In Sulawesi, our researchers have developed strong collaborations with local government, NGO and industry stakeholders, including Mars Chocolates and other cocoa buyers. These partnerships enables us to select more robust and high yielding cocoa genotypes, improve the sustainability and profitability of cocoa farming, and develop new business opportunities, especially for women and youth. It also develops the scientific capacity of Indonesian researchers.

The Cocoa Sustainability Partnership in Makassar, developed from this collaboration, provides a forum for the ongoing development of the industry. This collaboration provides a model that we are currently extending to other cocoa-producing countries in the Asia-Pacific region.

Benefits have been realised at all levels of the community. Smallholder cocoa farmers have benefited from higher production and income diversification by intensifying cocoa production and freeing surplus land for other food, livestock and cash crops, developing new enterprises that are often more “women-friendly”, and result in more diversified and resilient farm incomes. The adoption of improved management recommendations has also stimulated private sector activity through the sale of inputs and the increased supply of cocoa beans. Intensification also reduces the incentive for clearing rainforests to increase the area of cocoa planted.

Cocoa-based villages have benefited from improved organisation and access to services through the establishment of cooperatives, community development and development programs. As the global cocoa market responds to consumer demand for certified products, traceability and niche products, farmers are required to keep auditable records and to become more ‘professional’ in their approach to cocoa farming. Intensifying cocoa production and diversifying incomes is a good strategy for farmers, as it improves their understanding of the cocoa cropping cycle, appropriate management interventions, investment in future returns and consistent production.

Relationships with service providers, non-governmental organisations and private-sector stakeholders, including cocoa buyers, are easier to build and manage at the community level. The establishment of village cooperatives also generates the critical mass and facilities needed to attract and organise training and advice in health, education and business skills in these often-remote cocoa-growing communities.

Finally, increasing productivity and improving livelihoods in cocoa-farming communities benefits Australia by reducing dependence on aid and consolidating regional security. Australian chocolate companies also benefit through greater confidence in the supply of high-quality cocoa, which supports their efforts in certification and niche marketing. Increased chocolate production benefits the Australian economy directly because other ingredients - sugar and milk - are produced here.

Other relevant current projects

- Improved management strategies for cocoa in Papua New Guinea (ACIAR)
- Adoption Study: Project: ASEM/2003/015 Enhancing PNG smallholder cocoa production through greater adoption of disease control practices (ACIAR)
- Extension methodologies for smallholder producers of cocoa and other tree crops in the Pacific (ACIAR)
- Improving the sustainability of cocoa production in eastern Indonesia through integrated pest, disease and soil management in an effective and policy environment (ACIAR)
- Evaluating smallholder livelihoods and sustainability in Indonesian coffee and cocoa value chains (ACIAR)
- Food processing and value chain development in Indonesia (Australia-Indonesia Centre).

Relevant faculties, centres and experts

- Faculty of Agriculture and Environment
 - Faculty of Science
 - Faculty of Veterinary Science
 - Faculty of Arts and Social Sciences
 - University of Sydney Business School
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- Professor David Guest, Professor of Plant Pathology, Faculty of Agriculture and Environment
 - Associate Professor Budiman Minasny, ARC Future Fellow, Faculty of Agriculture and Environment
 - Dr Jeffrey Neilson, Senior Lecturer in Geography, School of Geoscience, Faculty of Science
 - Dr Russell Toth, Senior Lecturer in Economics, School of Economics, Faculty of Arts and Social Sciences

- Associate Professor Bill Pritchard, School of Geosciences, Faculty of Science
- Associate Professor Robyn Alders, AO, Principal Research Fellow, Faculty of Veterinary Science and Healthy Food Systems Node Lead, Charles Perkins Centre
- Associate Professor, Leanne Piggot, University of Sydney Business School

External collaborators

- Mars Chocolates
- La Trobe University
- Indonesian Coffee and Cocoa Research Institute
- Hasanuddin University, Indonesia
- University of Papua
- Assessment Institute for Agricultural Technology (AIAT), South Sulawesi, Indonesia
- PNG Cocoa and Coconut Institute
- PNG University of Natural Resources and Environment

ToR 5 - Innovative modalities and practices that would enhance the contribution of all relevant stakeholders in supporting agricultural development, better nutrition and inclusive economic growth in the Indo-Pacific region.

Case study

Creating new research and education hubs to nurture innovation and cross-sector collaborations

A team of 34 researchers from various faculties within and outside the University of Sydney is looking at the challenges to nutrition, diversity and food safety from a multitude of perspectives, with the ultimate goal of creating healthier and more sustainable communities.

The [Healthy Food Systems: Nutrition, Safety, Diversity Project Node](#) is a new and innovative research collaboration based within the University of Sydney, hosted by two leading multidisciplinary centres - the [Charles Perkins Centre for Obesity, Diabetes and Cardiovascular Disease](#) and the [Marie Bashir Institute for Infectious Diseases and Biosecurity](#),

Good food and nutrition are fundamental to individual wellbeing and healthy communities. Delivering sufficient, safe and nutritious food in a sustainable and ethical manner to meet the requirements of a growing human population is one of the world's greatest challenges.

Many of the inefficiencies of the modern food system(s) arise from fragmentation of its component parts and an absence of coordinated research across the disciplines. Human nutritionists, farmers, agriculturalists, animal health specialists, public health professionals and natural resource managers have largely worked in isolation from each other. By extension, there has also been a lack of efficient collaboration between academia and other sectors and their key stakeholder groups.

As part of the group's research, the multidisciplinary team is reviewing the political dimensions that can impact positively on food and nutrition security and safety. These dimensions range from legislative frameworks that improve the efficiency of disease control initiatives, to the optimal participation of women in agricultural research and extension.

The group's combined research and field expertise within Australia and in countries across Africa and the Indo-Pacific is being put to use to investigate the social, economic, political and environmental drivers of dietary outcomes, and to develop innovative solutions that will enable existing resources to be used more efficiently, effectively and sustainably. Our node members are involved in food and nutrition security research that encompasses maternal and child health and nutrition, food security, water security, One Health economics, social anthropology, food systems, animal diseases and health problems, and value chain analysis.

Key to this work is the interrelationships between farmers, traders, regulators, consumers and policy-makers to determine policies and food systems that deliver sustainable, ethical, feasible and optimal diets. We are facilitating dialogue between researchers and public and private sector partners in relation to nutrition-sensitive and gender-sensitive value chains. For example, our [Nutrition-sensitive Value Chain Symposium](#) held at the University of Sydney in August 2015 was a joint effort with the Australian Centre for International Agricultural Research, The Crawford Fund and Food Systems Innovations (joint initiative by DFAT, CSIRO and ACIAR) and involved representatives from the public and private sectors.

This multi-sectoral and interdisciplinary approach is also a feature of our international engagements where the Ministries of Agriculture, Health and Social Welfare are actively involved in project implementation. For example, through our projects in Tanzania and Timor-Leste, we have helped establish active working groups involving the Ministries of Agriculture, Livestock and Health with a common vocabulary and a commitment to developing locally-appropriate sustainable food-based approaches to malnutrition.

These types of collaborative approaches are crucial if we are to address the double burdens of under- and over-nutrition. The human and financial costs associated with this situation are staggering and place huge strain on national budgets that are already stretched. Meanwhile, support for agricultural research and development has declined markedly. We are working to enable health and agriculture to come together to provide a cost-efficient solution to these challenges. Nutrition-sensitive value chains are currently under discussion in the international development arena in relation to food security and human health. The approach provides a framework for multidisciplinary discussions around all aspects of food and nutrition security from soils, food production to market chains, to consumers, food wastage, human physiology and social and cultural issues.

Other relevant current projects

- Strengthening food and nutrition security through family poultry and crop integration in Tanzania and Zambia (ACIAR 2012)
- Developing a model for understanding and promoting dietary diversity in Zambia (ACIAR 2014)
- Discovering the links between poultry health and human diets and nutrition in Timor-Leste (DFAT Dili and University of Sydney 2014)
- Using system dynamics to investigate food system interventions for improved nutrition: A case study in Tanzania (IMMANA Post Doc Fellowship research project implemented by members of the Healthy Food Systems Node working at the Royal Veterinary College, London and University of Sydney)

Relevant faculties, centres and experts

- Healthy Food Systems – Nutrition, Diversity, and Safety Project Node, Charles Perkins Centre
- Associate Professor Robyn Alders, AO, Principal Research Fellow, Faculty of Veterinary Science and Healthy Food Systems Node Lead, Charles Perkins Centre

- Faculty of Agriculture and Environment
- Faculty of Arts and Social Sciences
- Faculty of Science
- Faculty of Veterinary Science
- Sydney Medical School
- University of Sydney Business School

- Charles Perkins Centre
- Marie Bashir Institute
- Menzies Centre for Health Policy
- Sydney Environment Institute
- Westmead Millennium Institute for Medical Research

External collaborators

- Australian Centre for International Agricultural Research (ACIAR)
- Consultative Group for International Agricultural Research (CGIAR)
- The Crawford Fund
- Food Systems Innovation (FSI) initiative
- The Australian National University
- The University of Newcastle, Australia
- The University of London
- The University of the Witwatersrand, South Africa

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