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Science Agency

Inquiry into the role of Australian agriculture in Southeast Asian markets

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Contents

Executive Summary	iv
Introduction	5
CSIRO response to the Terms of Reference (ToR)	6
Leveraging partnership opportunities	6
Strengthening capability	7
New and emerging opportunities	8
Mechanisms for engagement and partnerships	9
Food security	10
References	12

Executive Summary

Australian agriculture's role in Southeast Asia is much more than the products we export. Agriculture provides pathways for partnerships, collaboration, and shared innovation systems learning across the region. Here we summarise key messages for each of the Terms of Reference (ToR).

ToR a. How the Australian Government can support agriculture and food industries in leveraging partnership opportunities within the region.

- Ensure greater understanding of trade systems, supply chains, and stakeholder roles to identify and build market opportunities in the region.
- Maintain and enhance credibility as a safe, clean, and green supplier to Australian and Southeast Asian markets.
- Leverage evidenced-based partnership initiatives to support harmonisation of trade across Australia and ASEAN.

ToR b. Opportunities to build and strengthen partnerships in Southeast Asia to build capability in the region, including in animal and plant biosecurity, adapting to a changing climate, improving agriculture sustainability, and agriculture technology and innovation.

- Position Australia as Southeast Asia's innovation partner.
- Enable enduring systems that build capability and capacity.
- Building capacity and capability in the region brings benefits back to Australia.

ToR c. Identifying new and emerging opportunities and challenges in the region for the Australian agriculture industry, including enhanced market intelligence for exporters to support them to navigate markets and realise opportunities.

- Support coordination, collaboration, and regulation to drive inclusive and sustainable growth for the protein sector.
- We have a unique opportunity to make systemic changes to managing biosecurity risks.
- Australia has an opportunity to take on a leadership role in building sustainable, productive, and resilient agriculture and food systems, both domestically and in the region.

ToR d. Mechanisms for government and industry to leverage identified opportunities for Australian agriculture, and to address key priorities in the Southeast Asia region.

- Encourage platform and programmatic approaches to target specific research and innovation challenges to encourage broader learning and solutions.

ToR e. How Australian agriculture can support Southeast Asia's food security [towards 2040].

- Systems perspectives and transdisciplinary science is critical to support improved regional food security.
- Practices and technologies need to be fit for purpose.

Introduction

CSIRO welcomes the opportunity to provide input to the House of Representatives inquiry into Australian agriculture in Southeast Asian Markets.

CSIRO is focused on contributing to sustainable development and food security amidst global challenges, with the goal of helping safeguard our region from threats alongside supporting the growth of our industries.

Our work in Southeast Asia focuses on supporting national economies and rural livelihoods with significant research investment in agriculture, food, health, and biosecurity. Our presence in the ASEAN region is designed to foster and deepen diverse partnerships in the region and work closely with government and industry leaders to better enhance the impact of our science and technology. Australian agriculture will continue to play a crucial role in Southeast Asian markets, not only for the goods and services it brings, but also through the partnerships, capacity building, and knowledge sharing that engaging in the region fosters.

This submission provides input on all five Terms of Reference and focuses on CSIRO's experience and expertise in innovation system partnerships between Australia and Southeast Asia. We also highlight several roadmaps relevant for Australia's Southeast Asia Economic Strategy to 2040, which provide pathways to address grand challenges for Australia and the region.

CSIRO response to the Terms of Reference (ToR)

Leveraging partnership opportunities

ToR a. How the Australian Government can support agriculture and food industries in leveraging partnership opportunities within the region. This includes new and improved market access, streamlining trade systems, and supporting industry to identify and build market opportunities in the region.

International trade is facing ongoing challenges due to a wide range of economic and environmentally driven disruptions. Innovation partnerships within the region support the resilience of trade systems and continuity of market access for Australian industries.

KEY MESSAGE 1. Ensure greater understanding of trade systems, supply chains and stakeholder roles in order to identify and build market opportunities in the region. CSIRO has continued to work in understanding export market perceptions of Australian produce and, in doing so, embeds multi-stakeholder partnerships in projects to gain a robust understanding not only of consumer perceptions, but also the perceptions of various stakeholders along the supply chain. CSIRO efforts in understanding food credence attributes for beef and horticulture exports to Vietnam, China, and the UK explicitly included not only consumer perspectives, but also those of importers, wholesalers, and retailers, in partnership with local universities and Austrade. The study not only identified food characteristics that consumers were willing to pay for, but also procurement decisions by importers, wholesalers and retailers that can limit or facilitate trade at a higher level, such as Australia's reputation, traceability, and food regulation governance (Zhang, et al. 2023; Schrobback, et al. 2023).

KEY MESSAGE 2. Maintain and enhance credibility as a safe, clean, and green supplier to Australian and Southeast Asian markets. Maintaining credibility and trust of Australia's national brand is vital in ensuring continuity of trade in the region, but this needs to be supported by evidence of ongoing action and improvement. The CSIRO roadmap, 'Reshaping Australian Food Systems' identified four out of five focal areas linked with sustainability action (CSIRO Futures, 2023). Similarly, Southeast Asian nations are looking at sustainable development goals, and will continue to seek partnerships and suppliers who are able to provide safe and sustainable produce to growing populations. By having a whole of food system approach to sustainability, Australian food – regardless of destination – will have 'clean and green' at its core. An example of infrastructure that provide such assurances include the Australian Centre for Disease Preparedness (ACDP) in Geelong (<https://www.csiro.au/en/about/facilities-collections/ACDP/ACDPs-global-role>). ACDP is an international reference laboratory and collaborating centre for the World Organisation for Animal Health (WOAH) and provides expert advice on the development of standards and laboratory tests that are used and accepted for international trade under Sanitary and Phytosanitary (SPS) agreements of the World Trade Organisation (WTO). The testing and research performed at this national biocontainment laboratory underpins market access, and assurances that Australian food is safe.

KEY MESSAGE 3. Leverage evidenced-based partnership initiatives to support harmonisation of trade across Australia and ASEAN. Harmonisation – the alignment of national procedures with

international conventions, standards, and practices – can reduce trade barriers and enhance market access and growth through simplification and consistency (Kaur and Kau, 2022). In the area of biosecurity alone, there are considerable opportunities across ASEAN countries for harmonising how trade related risks are managed both effectively whilst not unnecessarily restricting trade (van Klinken, et al., 2023). Initiatives that underpin biosecurity agreements and negotiations, such as the compilation of risk reduction measures, tools and frameworks (for example, CSIRO’s work on Phytosanitary Risk on <https://research.csiro.au/prs/phytosanitary-risk-tools/>), boost Australia’s capacity to engage in trade harmonisation efforts in the region, while proactively managing current and future biosecurity risks.

Strengthening capability

TOR b. Opportunities to build and strengthen partnerships in Southeast Asia to build capability in the region, including animal and plant biosecurity, adapting to a changing climate, improving agriculture sustainability, and agriculture technology and innovation.

CSIRO has long-standing expertise in building capacity and capability in Asia, particularly in the areas of climate adaptation, resilience, biosecurity, climate and crop modelling, agricultural intensification, and innovation systems.

KEY MESSAGE 1. Position Australia as Southeast Asia’s innovation partner. A more strategic view on Australia-Southeast Asia partnerships is recognising that innovation in key areas such as climate change and sustainable agriculture will involve a level of collaboration where we come together as partners to develop our respective and shared innovation systems (Hall and Kelly, 2018). This approach focuses on what our nations can do together for shared benefit, rather than a technology transfer model. This philosophy underpins the [Aus4Innovation Program](https://research.csiro.au/aus4innovation/) (<https://research.csiro.au/aus4innovation/>), a \$33.5 million development assistance program that aims to strengthen Vietnam’s innovation system, prepare for and embrace opportunities associated with Industry 4.0, and help shape Vietnam’s innovation agenda in science and technology. Aus4Innovation recognises that helping Vietnam build its innovation system capacity, particularly in the field of sustainable, climate responsive, and inclusive agricultural development, is part of a long-term pathway way to building an innovation ‘architecture’ for both nations (Hall and Hays, 2022). Because of the Aus4Innovation program, Australia is also learning about its own innovation capacity and capability. As partnerships broaden across the region broader innovation system improvements can be expected.

KEY MESSAGE 2. Enable enduring systems that support building capability and capacity.

Enhancing knowledge and skills – capability building – is a long-standing strategy to proactively address challenges and opportunities in agriculture and food. There is also greater recognition that to build legacy of capability building efforts, a focus on capacity – the systems that support that capability – is also critical. In 2020, CSIRO partnered with Australian and Philippine institutions to run the ACIAR Agribusiness Masterclass (AMC), which was tailored for the Philippine context as identified through a prior needs assessment and strategy alignment (Lim-Camacho et al., 2021). Participants – purposefully representing private and public sectors – were selected not only for their ability to thrive in the course, but for also for the support given to them by their respective organisations, as well as for their ability to influence in the future. As a result, the AMC is now being run by Philippine agriculture R&D institution PCAARRD and taught by the graduates

themselves. The approach taken has enabled the building of institutional capacity as well as individual capability, enough to create a pipeline of talent embedded in institutions.

KEY MESSAGE 3. Building capacity and capability in the region brings benefits back to Australia.

Australia benefits from building capability in the region through flow-through benefits and CSIRO's work has shown that this can be achieved by focusing on specific challenges or through broader, more systemic approaches. The Australian Centre for Disease Preparedness (ACDP)'s International Program for example has several capacity building projects with government animal health laboratories across Southeast Asia (<https://www.csiro.au/en/about/facilities-collections/acdp/bicollab>) designed to support animal health diagnostics to enable certification for safe trade as well as support animal disease control programs in target countries. This helps strengthen the region's biosecurity by enabling faster detection and more rapid response for countries close to Australia. It also contributes to health outcomes by actively taking a One Health approach and working at the interface of humans and animals where new human pathogens (zoonotic diseases) often emerge. But the benefits don't end there. By building capacity for detection and management of emergency animal diseases that are endemic in Southeast Asia but exotic to Australia, we are also improving Australia's preparedness and addressing the problem at the potential source of introduction to Australia.

CSIRO's 2020 roadmap report, 'Australia's Biosecurity Future' also recognises the role international relationships play in bolstering Australia's biosecurity capability and preparedness (CSIRO, 2020). It highlights how partnerships with international counterparts allows for greater transparency and information sharing, including greater awareness of technology and policy development being implemented by other leading countries. The report also reflects on the long-term impacts of international collaborative projects in the biosecurity space, wherein international experience is seen to build Australian expertise for specific response pathways, species prioritisation and management while strengthening the nation's international networks.

New and emerging opportunities

TOR c. Identifying new and emerging opportunities and challenges in the region for the Australian agriculture industry, including enhanced market intelligence for exporters to support them to navigate markets and realise opportunities.

CSIRO has invested in better understanding new and emerging opportunities and challenges, by engaging deeply with stakeholders to identify, assess, and develop strategies for key sectors, including protein, biosecurity, and food systems in general.

KEY MESSAGE 1. Support coordination, collaboration, and regulation to drive inclusive and sustainable growth for the protein sector. The growing demand for proteins in Australia and in Southeast Asia presents both challenges and opportunities, as we consider more sustainable and nutritious food options from a growing number of consumers. The CSIRO Protein Roadmap identified several science and technology focus areas alongside innovation ecosystem priorities needed to support the growth of the sector (CSIRO Futures, 2022). Both sides are critically important because as technological solutions allow us to create new products, services, and livelihood development opportunities, coordination and governance will enable such solutions to be applied in an inclusive and sustainable manner.

KEY MESSAGE 2. We have a unique opportunity to make systemic changes to managing biosecurity risks. Increasing biosecurity threats, including the COVID-19 pandemic, shows that scaling our current approaches to incursions is not enough to mitigate these growing risks. As a region, Australia, and Southeast Asia can benefit from greater collaboration and shared responsibility where innovation in science and technology is supported by enhanced collaboration, digital transparency, and co-developed solutions (CSIRO, 2020).

KEY MESSAGE 3. Australia has an opportunity to take on a leadership role in building sustainable, productive, and resilient agriculture and food systems, both domestically and in the region. The 2023 CSIRO Food Systems Roadmap identified five focal areas that will drive progress: 1) enabling equitable access to healthy and sustainable diets, 2) minimising waste and improving efficiency, 3) facilitating Australia's transition to net zero emissions, 4) aligning resilience with socioeconomic and environmental sustainability, 5) increasing value and productivity (CSIRO Futures, 2023). But the systems to produce, distribute, and consume food are complex, largely due to the diverse inputs, actors, processes, and objectives we have put in place and expect (Nelson, Hall and Farr, 2024). The task is large and complex, and having a better understanding of how the food system impacts the economy, society, health, and the environment through national reporting systems is an ideal starting point for Australia to position itself as a leader in supporting sustainable, productive, and resilient food systems in Southeast Asia.

Mechanisms for engagement and partnerships

TOR d. Mechanisms for government and industry to leverage identified opportunities for Australian agriculture and to address key priorities in the Southeast Asia region.

KEY MESSAGE. Encourage platform and programmatic approaches to target specific research and innovation challenges to encourage broader learning and solutions. Research and development are considered effective mechanisms for identifying, targeting, and addressing opportunities and challenges for agriculture in Australia and Southeast Asia. Alongside the evidence base, research and development processes and approaches provide avenues for allowing coincidental learning and partnerships. Large programs such as *Aus4Innovation* (<https://research.csiro.au/aus4innovation/>) for Vietnam and the Applied Research and Innovation system in Agriculture program (ARISA, <https://www.csiro.au/en/about/corporate-governance/ensuring-our-impact/impact-case-studies/future-industries/arisa>) for Indonesia are good examples of this. Both programs have focused on collaboration, research, and implementation to understand how agriculture research, science, and technology can be scaled through the development of innovation support mechanisms and systems. While the focus of the work has been firmly grounded in the commercialisation of research findings and the incubation of promising technological developments from Australia, CSIRO collaboration has also maintained a significant focus on policy and institutional reform to enable innovation processes and practices that target climate change, social inclusion, sustainability, and the responsible deployment of artificial intelligence technologies (CIE, 2020; Hall and Hays, 2022).

CSIRO is also partnering with DFAT and DAFF to establish an Asia-Pacific Bioprotection Research Alliance to enable key bioprotection issues (e.g. pests, weeds, diseases) impacting food security to be collaboratively addressed through relevant research. Doing this not only addresses the priorities of our neighbours, it also enhances biosecurity for Australian agriculture.

Food security

TOR e. How Australian agriculture can support Southeast Asia's food security [towards 2040].

Despite significant improvements over the past decade, food insecurity is still a significant issue in parts of Southeast Asia. This is often, but not exclusively, in resource-poor rural areas amongst small land-holding households. They are also those that are likely to be most impacted by climate change or other disruptions in the food system. Hence, development of practices and technologies to elevate the food security of those most vulnerable needs to be targeted and cognisant of the constraints faced by these people.

KEY MESSAGE 1. Systems perspectives and transdisciplinary science is critical to support improved regional food security. CSIRO has contributed to this through bringing diverse expertise to R&D to help provide broad perspectives on pathways to improve production efficiency, systems resilience, market access, and policy settings (Williams, et al. 2022). Bringing together this diverse expertise can help identify otherwise unclear constraints to production or adoption, market failures, and help identify more efficient and effective pathways to impact.

An example of this approach is the Aus4Innovation program which has focussed on building research and policy capability to effectively mobilise innovation for agri-food system transformation. This work is not just helping partner countries deal with food security, but includes other systemic, social scale challenges that intersect and are integral to achieving food security goals (Hall and Hays, 2022). Related challenges include coping with climate change, sustainability / emissions reduction and access to international and high value domestic markets, inclusive growth models, biodiversity loss, etc. This has demonstrated the need to consider broader implications or constraints such as risks, social implications, and environment.

CSIRO has collaboratively developed and deployed whole-farm systems modelling to capture biophysical and socio-economic aspects of innovations and their implications for household food security (Lisson, et al. 2010). This approach can be highly valuable at several stages of development of R&D to test and validate potential options. Firstly, during R&D prioritisation these can highlight potential constraints to adoption or demographics that will benefit more/less from new practices/technologies. They can allow a range of potential future scenarios to be explored accounting for changes and variability in climate, markets, prices, or production system. Secondly, participatory modelling can help researchers and other stakeholders explore the fit of new ideas in a particular context with a particular production environment with certain land and labour resources. Thirdly, it supports wider policy and adoption by providing confidence in the benefits of new technologies.

KEY MESSAGE 2. Practices and technologies need to be fit for purpose. Generic solutions run the risk of leading to counter-productive outcomes which can diminish on-going relationships with target stakeholders. There is often not a shortage of technologies to support agricultural production, it is the integration and adoption of appropriate technologies into the system that is often challenging. There are often various risks involved with adopting new technologies and practices that require localised evidence that they will be effective and suitable in local production systems.

On-farm testing and demonstration of new technologies is critical to validating them in real-world contexts. This requires a participatory engagement with end-users and others in the supply chain

(i.e. information providers, input suppliers, traders, end-point markets). This is critical to reducing the risks of adoption of new technologies and ensures that solutions are locally appropriate.

Many farms/farmers produce a range of products (staple cereal crops, livestock, vegetables) with both socio-cultural and economic values and hence taking a single commodity or outcome focus is not effective. Trade-offs between components of the system need to be considered. An example of this was evident in research in Eastern Indonesia which showed that intensifying livestock production with improved forages would likely displace key staple grains for some farmers and hence actually reduce their food security (Bell, et al. 2020).

Australian agricultural expertise (particularly northern Australia) is often well placed to help find fit-for-purpose solutions. Australia is faced with many similar challenges, similar environments mean that many of our practices, crops/livestock and their management are more transferrable to parts of Southeast Asia.

KEY MESSAGE 3. Support small-holder subsistence transition to more market-oriented production systems. Targeting specific market opportunities and developing production and market systems that allow small holders to engage in these is essential for them to grow their household incomes and alleviate poverty. There are numerous examples of how multi-disciplinary approaches capturing the whole value chain from producer to end-user have brought about positive benefits for not just farmers but also post-farm value chain actors.

Example 1. Inclusive value chains: In the Philippines, CSIRO is working with ACIAR and Australian and local partners to aims to enhance the design, implementation, and adoption of *inclusive value chains* (<https://www.aciar.gov.au/project/agb-2018-196>) in smallholder farming systems. The project works with vegetable and coffee value chains, from smallholders to major corporations, to identify interventions that will improve engagement along the chain while benefiting livelihoods and communities.

Example 2. Livestock development: In many parts of south-east Asia there has been growing demand for livestock products (e.g. milk and meat) which has presented an opportunity for small-holder farmers to diversity their income through livestock intensification. CSIRO has supported several research programs that have influenced regional policies and road-tested practices that support development of livestock production systems in Indonesia, East Timor, Laos, Vietnam, Myanmar, Philippines, and Cambodia (Dahlanuddin, et al. 2017). These systems required working with producers, traders, processors, and end-users to develop products suitable across the whole-of-value chain. This involved rigorous testing of appropriate livestock genotypes, animal husbandry practices, robust and diverse feed and forage technologies, forage seed supply, and trading systems.

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