



Charles Sturt
University

Senate Rural and Regional Affairs and
Transport References Committee

Adequacy of Australia's biosecurity measures and response preparedness

Senate Standing Committee on Rural and Regional Affairs and Transport inquiry into the adequacy of Australia's biosecurity measures and response preparedness

Submission from Charles Sturt University

Charles Sturt University welcomes this opportunity to provide information to the Senate Standing Committee on Rural and Regional Affairs and Transport on the adequacy of Australia's biosecurity measures and response preparedness.

Australia's ability to detect and respond to biosecurity threats depends on a broad-based and geographically wide-spread capability underpinned by up-to-date scientific and technical information and high-quality infrastructure. Much of this capability is based in or depends on universities, especially in view of their role in the education, training and upskilling of border security personnel, veterinarians and others; their provision of research, information and data to producers, manufacturers, communities and governments; and their expertise in agricultural and environmental sciences and in human and animal health.

In addition, regional universities like Charles Sturt can provide a direct link to producers and manufacturers at most risk from biosecurity threats like foot-and-mouth disease and the varroa mite, support rapid detection and testing, and facilitate collaboration between state and national agencies. For example, the University is already a partnership 'node' for emergency disease response by the NSW Department of Primary Industries' State Veterinary Laboratory at Menangle. Facilities and equipment at the University such as rapid thermocyclers (used for DNA sequencing, cloning, PCR testing and so on) and liquid handling robots allow for rapid in-house and in-field diagnostics. Discussions are under way between the NSW Chief Veterinary Officer, Charles Sturt University and the University to expand this partnership to provide veterinary epidemiology support for preparedness and response.

This submission is focused on biosecurity training, education and research at Charles Sturt, with information on specific projects at the University, how they support stronger biosecurity capabilities in Australia and the Asia-Pacific region, and on related issues the Committee may wish to consider.

In particular, we would like to draw the Committee's attention to the new Biosecurity Training Centre, based on the University's Wagga Wagga campus and funded by the Department of Agriculture, Fisheries and Forestry (DAFF). The Centre provides on-site training for biosecurity officers from around the country. Over the next few years it will expand to provide mixed-mode instruction at sites around Australia, and eventually in other countries in the Asia-Pacific. The Biosecurity Training Centre therefore has a key role in building both domestic and off-shore capability to detect, prevent or manage biosecurity incursions, increasing the chances of Australia being able to deal with biosecurity threats before they reach our borders.

Charles Sturt University would welcome the opportunity to provide the Committee with more information on any of the projects or issues discussed in this submission, or the University's broader role in biosecurity education, training and research.

Recommendations:

- More inclusive consultation on biosecurity responses involving biological control (e.g. viruses), including engagement with First Nations peoples as a priority
- Improving the knowledge and skills underpinning on-the-ground Emergency Animal Disease investigation and response, including via more effective coordination of state and Commonwealth training initiatives
- Further investment in new models for training and upskilling, including accredited microcredentials and the use of augmented and virtual reality technologies.

- Improved data-sharing to support faster detection and response, for example using the Australian AgriFood Data Exchange

About the University

Charles Sturt is Australia's largest regional university, with more than 43,000 students and approximately 2,000 full time equivalent staff. We are a unique multi-campus institution based in some of Australia's most vibrant regional communities. We have campuses in Albury-Wodonga, Bathurst, Canberra, Dubbo, Goulburn, Orange, Port Macquarie and Wagga Wagga, all with strong connections to surrounding rural, regional and remote communities.

Charles Sturt's history in agriculture education, research and innovation extends back almost 130 years, to the establishment of Experimental Farms in Bathurst and Wagga Wagga. Charles Sturt is now the largest regional university training the future agricultural, environment and veterinary workforce.

Charles Sturt University offers undergraduate and postgraduate degrees in Agriculture, Agricultural Science, Farm Production, Horticulture, Veterinary and Animal Sciences, and Viticulture, among others. At present there are more than 1600 students in agriculture and environmental sciences and almost 700 students in veterinary and animal sciences at the University. Combined, they make up around five per cent of total enrolments, and according to Department of Education data Charles Sturt University trains more than 10% of the country's vets and about a quarter of Australian agriculture students and graduates. Around a quarter of the district veterinarians employed by NSW Local Land Services are Charles Sturt graduates, evidence of our essential role in training the regional workforce.

As around 75% of Charles Sturt graduates go on to work in regional areas, our contribution to the regional workforce in these fields is even more significant.

The University is home to first-rate teaching and research facilities including:

- labs rated for research in genetically modified organisms,
- greenhouses and growth chambers providing full control over temperature, water and other conditions,
- the largest purpose-built facility in the Southern Hemisphere for studying root development (the Rhizolysimeter),
- the Equine Isolation facility, designed for the confinement, testing and treatment of horses with a range of diseases including Hendra virus, and
- a working 1600-hectare farm which in recent years has also become a test-bed and proving ground for digital innovation in agriculture such as the adoption of smart sensors.

Together, these facilities afford students and researchers in agriculture, horticulture, viticulture and animal health and sciences an opportunity for hands-on experience unmatched by any other university in Australia.

In recent years, Charles Sturt University has made significant investments in new facilities to boost participation, grow our research, and deepen our relationship with regional communities. These include our new School of Rural Medicine in Orange, a rapidly expanding campus in Port Macquarie, a new IT and cyber security institute in Bathurst, and the Gulbali Institute for Agriculture, Water and the Environment in Wagga Wagga, opened in March 2022.

We have also established partnerships with local employers including regional health services, with national and international firms such as IBM, Transgrid, John Deere and Marathon Health, and with government agencies including the NSW Department of Primary Industries, CSIRO and DAFF)

Our relationship with DAFF is underpinned by a strategic partnership agreement signed in December 2020. The agreement will support the development and implementation of evidence-based agricultural, water, and environmental policy and aims to bring mutual benefits to both organisations, improving research and capability by sharing knowledge and skills.

Under a strategic partnership agreement, the University provides workforce development for DAFF in the form of stackable microcredentials and undergraduate and postgraduate degree programs, and biosecurity skills development through the new Biosecurity Training Centre. Charles Sturt also provides some research services, and supports outreach and extension activities by the Department. In return, there are secondment, internship and joint research project opportunities for Charles Sturt staff and students.

Gulbali Institute

The new Gulbali Institute is a centre for integrated agriculture, water and environment research at in the heart of the Murray-Darling Basin, with a focus on the University's research strengths in areas such as optimising farm systems for performance and sustainability, and enhancing the health and resilience of freshwater ecosystems.

The name of the institute is taken from a Wiradjuri phrase, 'Gulbali ngurambang' is which translates to "to understand country". The name was chosen after consultation with Wiradjuri First Nations people.

The Gulbali Institute has four main research centres:

- Biosecurity,
- Food and beverage innovation,
- Environmental Stewardship, and
- Water and fisheries.

The Institute brings together multidisciplinary research teams, enabling a holistic approach to research that provides solutions that are comprehensive, authoritative, and reflective of our economic, natural and social aspirations. This includes research that addresses major national challenges and government, industry, and community strategic imperatives. Our multidisciplinary approach, together with the application of an innovation framework, will lead to the translation research and viable industry partnerships.

AgriPark

The AgriPark is at the heart of the University's future plans, particularly for our Wagga Wagga campus, and is well aligned to national goals for the agriculture and fisheries industries, the food and beverage manufacturing sectors, and for regional economic development focused on productivity, sustainability and shared prosperity.

The AgriPark is a unique ecosystem that accelerates innovation in agriculture through collaboration between industry and researchers. It supports national goals to increase collaboration, boost innovation and productivity, develop new industries and, along with Charles Sturt's well-established and highly regarded undergraduate and postgraduate programs in agricultural and veterinary sciences, address serious and persistent agriculture workforce shortages. The AgriPark will also help achieve the National Farmers Federation goal of building Australian agriculture to a \$100 billion industry by 2030, a goal endorsed by Prime Minister Albanese in public remarks before the election.

To date Charles Sturt has invested more than \$10 million in the AgriPark, which now hosts 18 industry and government tenants and more than 120 staff. At present they are spread across the University's 2000-hectare Wagga Wagga campus, limiting opportunities for collaboration with each other and with Charles Sturt staff and students. The planned next phase of the development of the AgriPark involves the construction of a new building that will bring them together in a single location with state-of-the-art research and development facilities and shared office spaces. The AgriPark building will be adjacent to University labs and other facilities, and will foster greater collaboration and help the AgriPark expand to include at least 30 organisations and over 200 staff by 2025.

By boosting collaboration between students, researchers, producers and agtech firms, the AgriPark supports the development of a more innovative, flexible and environmentally sustainable agricultural sector – one able to apply new technologies and ideas, and respond to challenges such as climate change and biosecurity threats.

See: <https://agripark.csu.edu.au/>

Biosecurity Training Centre

In early 2022 Charles Sturt University successfully tendered to establish and operate a Biosecurity Training Centre (BTC) for DAFF. The new Centre, based at Charles Sturt's Wagga Wagga campus, was announced on 31 March 2022. The Department of Agriculture, Fisheries and Forestry describes the BTC as a 'key enabler' for *Commonwealth Biosecurity 2030* and the *Commonwealth Biosecurity Action Plan 2022*.

Charles Sturt University is a national leader in biosecurity, with extensive capabilities that align directly with the 'Ag2030' target adopted by the National Farmers Federation and the Australian Government. The University already delivers leading education in border management through the Centre for Customs and Excise Studies, and we have long-term experience in building capabilities for front-line critical services such

as the NSW Police and Ambulance services and the Australian Border Force – all programs involving partner co-design to meet industry requirements.

The BTC draws on the University's experience, infrastructure and research, the Drought Hub, the AgriPark, and our sector-leading expertise in online education, to strengthen Australia's biosecurity capability by provide training to biosecurity officers across the nation. The Centre offers residential programs in Wagga Wagga and is working toward the provision of mixed mode instruction in satellite training facilities in state capitals – all of which will help build a future ready, skilled and agile biosecurity workforce for Australia and neighbouring countries.

While the initial focus of the BTC is on boosting the nation's ability to prevent biosecurity incursions, the University has begun conversations with DAFF on improving the response to and management of biosecurity threats inside Australia's borders. We are also collaborating with the Department on the framework for the National Biosecurity Committee, to help improve interactions between Commonwealth and state authorities, and on helping near neighbours in the Asia-Pacific (including Indonesia and Timor-Leste) develop their own biosecurity workforce capabilities. The latter will support earlier offshore or pre-border detection and management of biosecurity threats to Australia.

The establishment of the BTC has already attracted interest from prospective industry partners looking to develop the capabilities of their own personnel. Industry engagement with the BTC will support its planned development into a Centre for Excellence for Biosecurity in the Asia Pacific Region by 2024, eventually providing participants with a pathway into undergraduate and postgraduate degrees. To date the BTC has trained three cohorts of students, and is well on track to train around 300 biosecurity staff in total by the end of 2022 and more than 400 front line border staff over the next 12 months.

See: <https://www.agriculture.gov.au/biosecurity-trade/policy/australia/biosecurity-reform/biosecurity-training-centre>

Digital agriculture

Charles Sturt University's Global Digital Farm, a partnership with Food Agility Co-operative Research Centre, is an integrated digital learning, innovation and research environment working within a full scale, commercial, mixed farm operation.

Through deployment of mobile sensing and action technologies, telecommunications innovations and the generation of data-fuelled insights, the Global Digital Farm is helping to unlock the power of data and digital technologies in ways that will help our farmers make the right decisions in the right place at the right time.

Digital agriculture has significant potential in boosting the nation's ability to detect and respond to biosecurity threats, particularly by affording efficient access to and co-ordination of the data that informs decision making processes around specific industry geographic distribution, incursion pathways and response co-ordination. For example, one of the four use-cases explored in the Australian AgriFood Data Exchange initiative – in which CSU is a Tier 1 partner – is the exchange and use of data to enable rapid response to a biosecurity incident in the viticulture sector.

Drought Resilience Adoption and Innovation Hub

The University is also home to the Southern NSW Drought Resilience Adoption and Innovation Hub, established in 2021 and funded by DAFF. The Hub is a consortium of nine regional partners including primary producers, industry and community groups, researchers, entrepreneurs, education institutions, resource management practitioners and government agencies. The Hub is a physical and virtual locus for user-driven innovation, research and adoption that facilitates transformational change through the co-design of a range of activities including R&D, research commercialisation and extension services.

On 7-9 June the Southern NSW Drought Resilience Adoption and Innovation Hub hosted the second annual Future Drought Fund 'Science to Practice' innovation forum at the Charles Sturt University convention centre on our Wagga Wagga campus. The forum connects the researchers, practitioners, farmers, agri-businesses, governments, and end-users who are making regional Australia more drought resilient, and involved presentations on sustainable agriculture, climate science, community development, and farm business management. The Drought Hub also hosts workshops, seminars and field days for stakeholders from across the Riverina. Events of this type provide an ideal channel for communicating research findings, government updates and the latest developments in agricultural and environmental practice to those who can make immediate use of them.

See: <https://research.csu.edu.au/engage-with-us/research-impact/southern-nsw-drought-resilience-hub>

eXtended Reality Centre

The eXtended Reality Centre (XRC) conducts applied research on the use of creative immersive technologies to enhance the human experience beyond the physical world. These technologies can be applied across all industries to develop smarter, faster, cheaper and safer training, education and research.

For example, the XRC created a 360° 'Virtual Farm Gate Visit' for remote learning for DAFF. The Virtual Farm Gate can be used to instruct field personnel on the risk of introducing pests and diseases to farms, and how these risks can be mitigated. The Virtual Farm Gate employs a short video and VR hotspots to help users work through a short biosecurity checklist, so that they can familiarise themselves with the basic protocols before they visit a real farm. For the BTC, XRC has also developed a virtual farm tour to demonstrate the importance of biosecurity to the farming industry.

See: <http://xrc.csu.domains/DAWE-VFGV/>

The XRC is currently developing a 3D animation using real-time game engine technology to show the potential impact of a biosecurity disease incursion or outbreak on Australian regions. The outbreak to be demonstrated is *Xylella fastidiosa* in a wine region, with the visuals showing how the disease could quickly spread and kill trees, as well as spread into other regions. The project will be completed by early September.

These and other projects – for example on the safe storage and transport of agricultural chemicals – could be readily adapted for use in other industries, such as mining, or to education the wider public on the importance of biosecurity measures.

Biosecurity research at Charles Sturt

Animal health

Biosecurity research is a recognised strength at Charles Sturt. The University has worked extensively over the past decade on projects to improve national, state and regional capacity to respond to emergency animal diseases (EADs) and other biosecurity threats, in partnership with industry and government organisations such as DAFF, Animal Health Australia (AHA) and NSW Department of Primary Industries.

The Veterinary Clinical Centre (VCC) at Charles Sturt includes a diagnostic facility that can receive and process samples suspected of carrying organisms that present a biosecurity risk to industry, as well as development work on novel approaches for food security through packaging, storage and stability solutions can be delivered through our food grade and certified Red Meat Innovation Centre on the Wagga Wagga campus. The VCC also includes a new equine isolation facility, a state-of-the-art isolation/containment environment for foals and adult horses with suspected or confirmed infectious and communicable diseases in southern NSW, ACT and northern Victoria. The \$5.4 million facility has six climate-controlled isolation stables with separate air flow and drainage systems, a PC2 laboratory, an examination room and dedicated waste management systems, and capacity to provide individualised intensive veterinary care requirements, including recumbent and critically-ill horses. This facility provides critically important clinical and biosecurity services to the veterinary industry, referring veterinarians, horse owners and patients of the VCC.

The equine isolation facility also provides valuable training of undergraduate and post-graduate veterinary students in the importance and delivery of infection control and biosecurity methods in veterinary practice. Undergraduate and postgraduate programs in veterinary sciences, veterinary technology and animal sciences at Charles Sturt provide training on biosecurity in animal systems, including how this can affect human health.

Over 2017-20 the University was a key partner in the \$11.7 million 'FMD Ready' project, led by CSIRO. The project aimed to improve national preparedness for dealing with EADs, using FMD as a case study. The CSU team worked on the farmer-led surveillance sub-project working extensively with livestock industry bodies, government agencies and primary producers. Subsequent evaluation confirmed the project had a significant impact on animal health and biosecurity stakeholders.

Animal and agricultural sciences courses at Charles Sturt provide a pipeline of personnel for the meat processing sector, with many students undertaking industry placements during their degrees along with their training in biosecurity, quality assurance and data technologies. The University has long-established partnerships with the sector, encompassing peak bodies like Meat and Livestock Australia (MLA) as well as local and regional producers and processors, and serve as a basis for knowledge sharing and collaboration

on various issues, including biosecurity. For example, Charles Sturt, MLA, P&P Optica Ltd and Teys Australia are partners in a \$4.6 million project to develop an automated beef offal screening system for disease and defect detection, a technology solution to ensure quality assurance of offal products and provide data driven outcomes for industry. The system has the potential to be extended to other species and adapted for use in relation to EADs.

Other projects include:

- implementation of electronic identification and tracing systems for livestock,
- assessing the prevalence of and risks from Salmonella infection in the Australian Thoroughbred horse breeding industry,
- land manager biosecurity planning and behavioural insights,
- improving farm biosecurity practices and management (funded by the Department of Agriculture, Fisheries and Forestry),
- improving on-farm biosecurity for Australian beef producers (funded by Meat and Livestock Australia),
- building shared responsibility for biosecurity (funded by the Australian Research Council),
- improving biosecurity engagement among egg producers in Australia (funded by the Australian Egg Corporation) and smallholder pig farmers (funded by Australian Pork),
- assessing the risk of exotic disease introduction and spread among Australian Barramundi farms from the importation of Barramundi products (funded by the Fisheries Research and Development Corporation), and
- mitigating the risk from avian flu for free range poultry (funded by the Poultry CRC and Woolworths).

Charles Sturt University researchers are also involved in a wide range of international biosecurity projects, including the European Cooperation in Science and Technology project 'Biosecurity enhanced through training, evaluation and raising awareness, 2021-2025', and two DFAT-funded projects to strengthen veterinary capability and capacity in South-East Asia and the Pacific.

THRIVE

The Training Hub promoting Regional Industry and Innovation in Virology and Epidemiology (THRIVE) is a new, Charles Sturt University-led collaborative \$4 million research initiative, funded through the Australian Government's Regional Research Collaboration Program, a one-off funding program designed to boost research capabilities in regional universities.

The project will build national and international collaborations for dealing with viral biosecurity threats, with partners including national and international zoonotic virology research institutes, CSIRO, Monash University, The University of Melbourne, the Australian National University, MLA, and Australian Pork Ltd.

THRIVE will tackle emerging and re-emerging viral biosecurity threats in regional Australia, such as oot-and-mouth disease, Japanese encephalitis, African swine fever, lumpy skin disease, avian influenza, Hendra and many others.

THRIVE will develop regional capacity and skills in agricultural epidemiology, disease modelling, and molecular virology that will then lead to production of rapid diagnostics, antimicrobials, vaccines, and innovative therapeutics.

THRIVE has four main pillars:

1. Surveillance and Epidemiology (investigating how viruses transmit between populations)
2. Molecular Virology (investigating how viruses overcome host defences to replicate)
3. Translational Virology (developing new diagnostics, vaccines, and antivirals)
4. Rural and First Nations Community Engagement (seeking input from the community, and encouraging virology research as a career choice for regional Australians)

While Charles Sturt welcomes Australian Government support for this project, the short-term nature of the Regional Research Collaboration Program highlights a key challenge for regional universities: building and maintaining research capacity (including infrastructure) necessary to meet the evolving needs of regional communities and industries. In biosecurity, this means having the ability to work with regional producers and firms to improve disease detection and management, and, if necessary, working with communities and health care services to prevent or minimise any impact on human populations.

The Committee may wish to consider the need for appropriately-funded research capabilities in regional areas in relation the adequacy of Australia's biosecurity measures and response preparedness.

Biosecurity issues, challenges and opportunities

Commonwealth Biosecurity 2030, released in 2021, sets out the scale of the challenges and opportunities for Australia. It shows that the national biosecurity system protects more than \$50 billion in agricultural exports every year (on track to double in value by 2030), more than \$70 billion in agricultural, fisheries and forestry production, around \$50 billion in tourism, and more than 1.6 million jobs across the agricultural supply chain. While there is significant national investment in biosecurity capability, it may not be sufficient to meet the scale of the threats and their potential impact on the Australian economy and on Australians' quality of life.

The biosecurity system has many partners, such as Commonwealth and state departments and agencies, industry peak bodies, education and research organisations, producers, manufacturers and many others. The breadth and complexity of the system necessitates strong system integration, currently managed through a number of mechanisms and with clear room for improvement, especially in:

- national and nationally-consistent training and education to meet the needs of different stakeholders,
- identification of gaps and risks, supported in part by social science research, and
- building capability in regions to support rapid response to and management of incursion (through projects like THRIVE).

Research at Charles Sturt University indicates there are also challenges and opportunities in fisheries and data sharing.

Fisheries

Charles Sturt is a national leader in aquaculture research, with a particular focus on freshwater and riverine species and biosecurity threats like carp and tilapia. Research at the University's Aquatic Laboratory in Albury-Wodonga, at the heart of the Murray-Darling Basin, is examining ways to bolster aquaculture in Australia, protect native fish species, and deal with potential threats.

Koi herpes virus

Carp cost the Australian economy around \$400 million every year in terms of ongoing control and management. In 2016 the Australian Government commissioned the preparation of a National Carp Control Plan (NCCP) to provide recommendations about the feasibility of and operational advice for implementation of a "carp virus" as a means of biocontrol for carp in Australia. The first stage of the plan involved research to inform a decision on the use of the virus. An initial recommendation will be released for public comment later in 2022. Use of the virus will depend on public support and the agreement of all states and territories.

Charles Sturt University strongly supports the proposed process for NCCP but also recommends that the public consultation process is sufficiently independent from government to enable all voices to be heard. Ideally, this would involve an independent panel (or panels, with separate bodies for each state) made up of community members, academics, First Nations people, international experts with experience in virus release, and government officials. The involvement of First Nations people is essential: the University understands from our own work with First Nations groups and communities that they have major concerns about the release of a novel virus into waterways and the potential for negative cultural impacts.

Potential incursion of Tilapia into the Murray Darling Basin

Tilapia is a restricted noxious fish under the *Biosecurity Act 2014*. They are listed in the world's 100 worst invasive species. They are regarded as one of the greatest threats to Australia's aquatic ecosystem.

Tilapia were introduced into Australia in the 1970s as ornamental fish. They are now distributed throughout many locations in Queensland and are threatening to invade the upper reaches of the Murray-Darling Basin. If tilapia become established in a flowing river or creek in the Murray-Darling Basin it will be almost impossible to eradicate them: females carry their eggs and small fry in their mouths, and these can survive for a long time after the adult dies, so living or dead fish in waterways can cause new infestations.

Charles Sturt suggests that the Committee could urge the Australian Government to take immediate action on the threat posed by tilapia, including:

- find and eradicate tilapia populations around Toowoomba and the upper reaches of the Murray-Darling system,
- run education programs to reduce the risk of spread,
- monitor tilapia infestations and spread through, for example, citizen science programs,
- investigate potential biocontrol options for dealing with an incursion into the Murray-Darling system, and

- develop a tilapia plan for the Murray-Darling system, with funding allocated for response measures in the event that an incursion occurs.

Ideally, these options would be developed in consultation with leading academics and community leaders including First Nations peoples.

Data sharing

While there is a great deal of understanding of the science associated with biosecurity threats, including the requirements associated with preparing for and responding to potential incidents, effective management of both threat and response requires data management, sharing and analysis – areas in which there is considerable room for improvement.

The management of a biosecurity incident requires knowledge of who and where are the potentially impacted producers and businesses, where has the threat come from, where might the threat spread to, and what are the vectors and conditions that enable transmission. Each of these components involves various kinds of data, which must be understood and shared before an effective response is possible.

At present in Australia this kind of data exists but is contained in disconnected, isolated or incompatible datasets managed by individual producers and businesses, industry bodies and local, state and national government agencies, limiting our preparedness for responding to biosecurity threats.

Charles Sturt University is part of an MLA-led project, the Australian AgriFood Data Exchange. The project aims to establish a national agricultural industry data exchange platform to facilitate the sharing of data across all levels of Australian agriculture. In addition to its potential impact on agricultural production, product traceability, compliance and food security, the Exchange will enhance national capabilities in biosecurity threat management and response.

See: <https://www.integritysystems.com.au/ozdata>