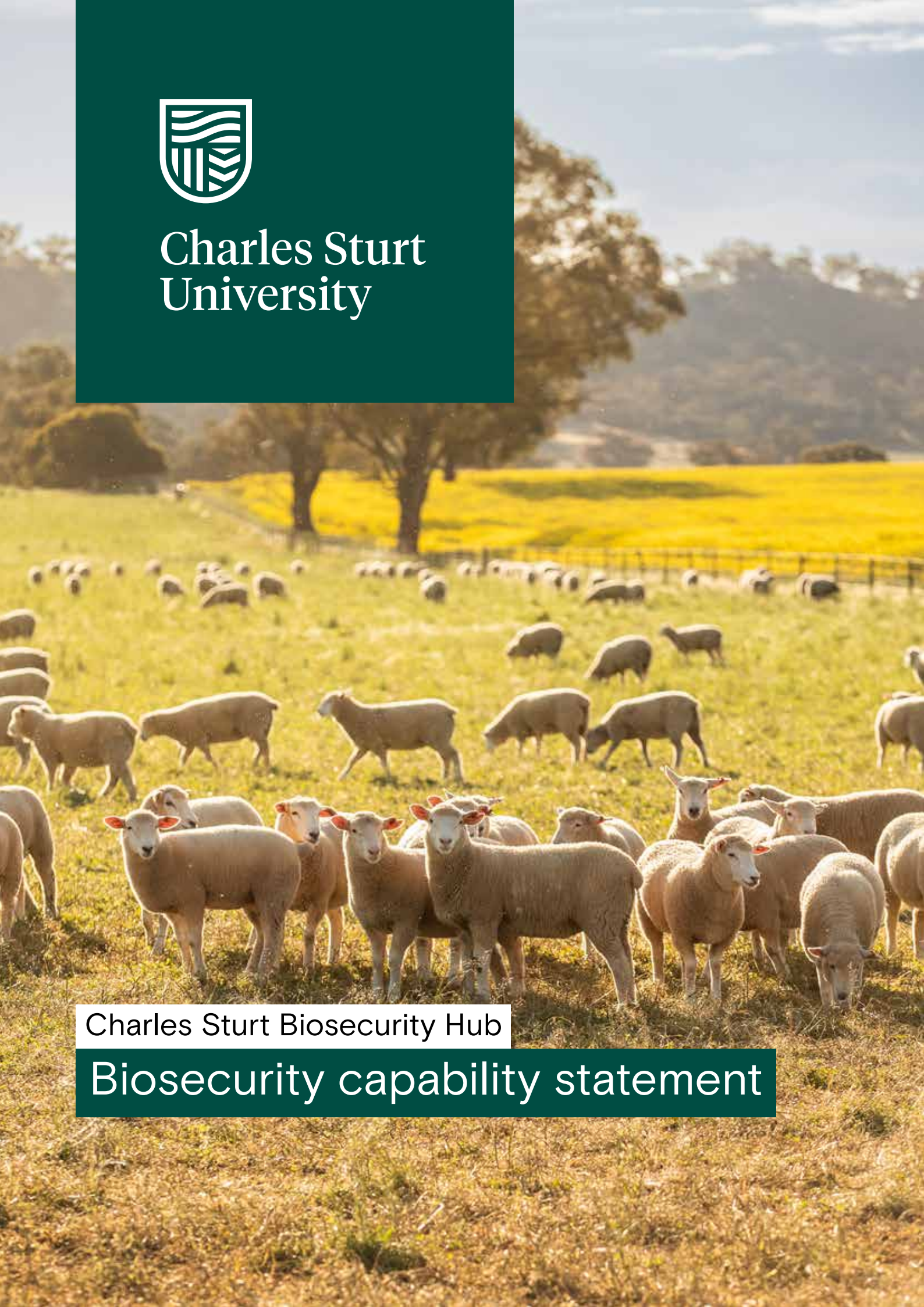


Charles Sturt University

Charles Sturt Biosecurity Hub

Biosecurity capability statement

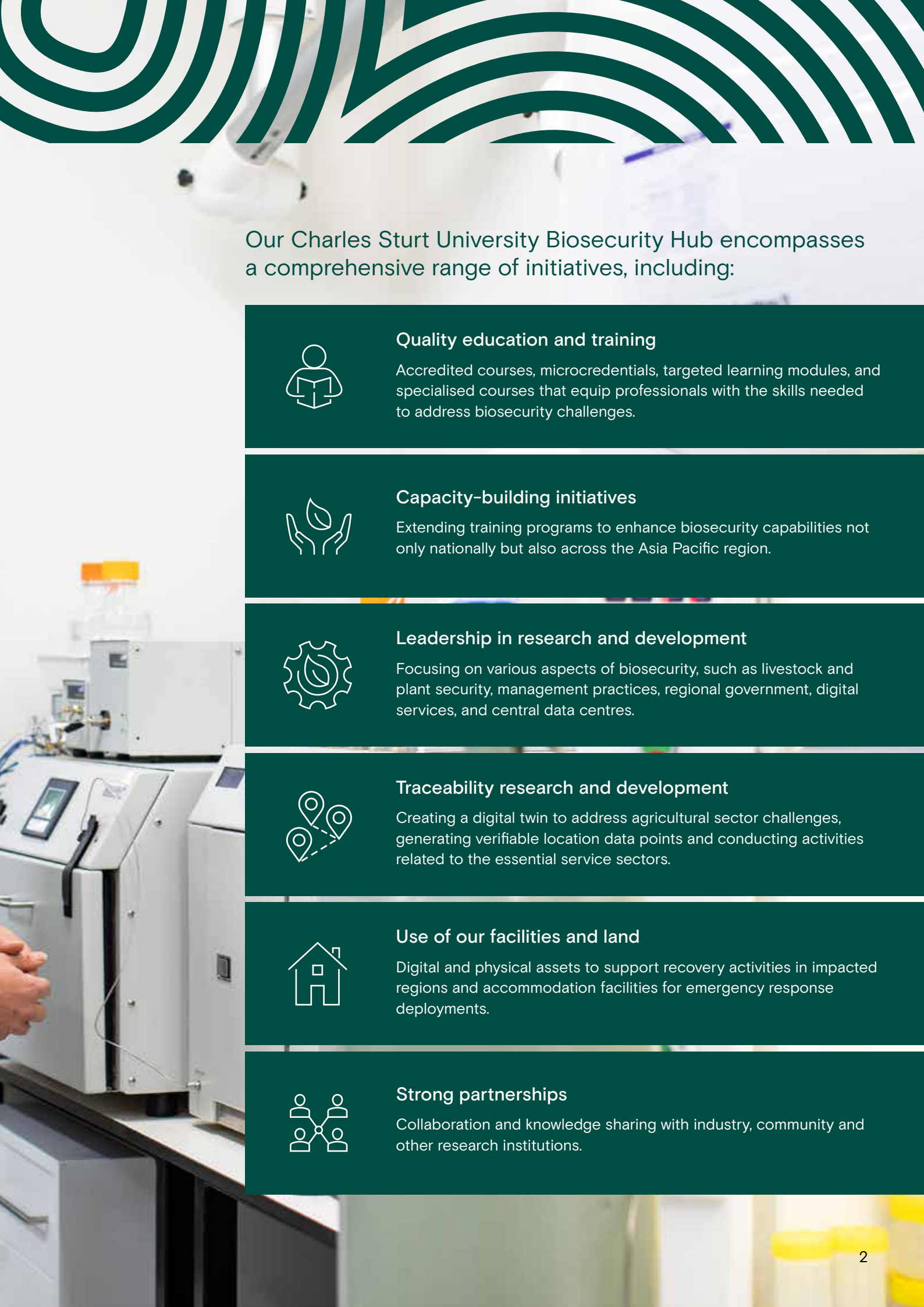
Safeguarding the nation

Charles Sturt University Biosecurity Hub

The Charles Sturt University Biosecurity Hub is a leading research and innovation hub, driven by a $30 million investment from the university and its partners in government and industry. With a focus on safeguarding Australia's environment, community, and economy, the hub's growing program of biosecurity activities is dedicated to identifying and mitigating biosecurity threats. Through strategic partnerships with higher education institutions, research organisations, governments, and local communities across the Indo-Pacific region, the hub is strengthening the biosecurity resilience of our neighbouring countries, ensuring a safer and more secure future for all.

The hub brings together a multidisciplinary team of expert researchers and scientists from various fields including microbiology, ecology, veterinary and animal science, environmental science, AI and cyber futures, extended reality, and biosecurity training. With access to state-of-the-art facilities, including cutting-edge laboratories, greenhouses, synchrotrons and field testing sites, our researchers are equipped to investigate the complex interactions between pathogens, hosts, and environments. From understanding the molecular biology of emerging diseases to developing novel diagnostic tools and vaccines, our researchers are committed to advancing the field of biosecurity and driving innovation in response to the evolving biosecurity landscape. We are able to disseminate information back to the farm gate through initiatives such as the Charles Sturt-led Southern NSW Drought Resilience Adoption and Innovation Hub.

> We are committed to supporting the government's vision for a biosecurity system that protects Australia's way of life.



Our Charles Sturt University Biosecurity Hub encompasses a comprehensive range of initiatives, including:

Quality education and training

Accredited courses, microcredentials, targeted learning modules, and specialised courses that equip professionals with the skills needed to address biosecurity challenges.

Capacity-building initiatives

Extending training programs to enhance biosecurity capabilities not only nationally but also across the Asia Pacific region.

Leadership in research and development

Focusing on various aspects of biosecurity, such as livestock and plant security, management practices, regional government, digital services, and central data centres.

Traceability research and development

Creating a digital twin to address agricultural sector challenges, generating verifiable location data points and conducting activities related to the essential service sectors.

Use of our facilities and land

Digital and physical assets to support recovery activities in impacted regions and accommodation facilities for emergency response deployments.

Strong partnerships

Collaboration and knowledge sharing with industry, community and other research institutions.

Our biosecurity expertise

Our Biosecurity Hub focuses on several key research areas aimed at enhancing biosecurity and addressing related challenges. These areas include:

Aquatic biosecurity

Safeguarding the health of fish and ecosystems.

Protecting animal health

Building resilience in animal biosecurity through a One Health approach.

Biosecurity in practice

Understanding the interplay between human behaviour, disease modelling, and management practices with a focus on One Health.

Surveillance for invasive species

Detecting and responding to threats.

Building resilience in plant security

Researching a safer, more sustainable food system.

Our research discipline areas

- Antimicrobial resistance
- Antivirals
- Biochemistry
- Diagnostics
- Disease modelling
- Disease surveillance
- Fungal disease management
- Immunology
- Infectious diseases
- Invasive weed ecology
- Metabolomics
- Molecular biology and virology
- One Health
- Parasitology
- Plant pathology
- Rural and First Nations community engagement
- Vaccine design
- Veterinary epidemiology
- Veterinary medicine
- Veterinary pathology
- Viral genomics
- Zoonoses

Our facilities

The Charles Sturt University Biosecurity Hub is supported by a range of advanced facilities that provide a unique environment for interdisciplinary collaboration and cutting-edge research and development, as well as serving to support and validate our research outcomes.

- 1600-hectare commercial farm
- Aquatic laboratory
- Equine Centre
- Equine isolation facility
- eXtended Reality Centre
- Field trial sites
- Glasshouses
- Horticulture facilities
- Innovative Hub
- AgriPark
- National Life Sciences Hub (NaLSH), including quarantine approved research areas
- Phytotron and growth chambers
- Pre-clinical centre
- Research winery and vineyard
- Rhizolysimeter
- Sheep and cattle facilities
- Veterinary Clinical Centre
- Veterinary Diagnostic Laboratory

Our education

We are committed to providing high-quality postgraduate programs focusing on biosecurity, shaped by cutting-edge research and collaborative partnerships with industry and community leaders.

Our diverse range of undergraduate courses offer strong foundations in sciences, preparing students for a range of careers in the field of biosecurity.

We partner with government agencies to deliver ongoing capacity-building initiatives in biosecurity, strengthening capabilities and addressing emerging challenges. We work closely with, and not limited to, Department of Agriculture, Fisheries and Forestry, Department of Primary Industries, Local Land Services, Australian Centre for Disease Preparedness and Scolexia.

Our world-class academic staff support Australia's biosecurity capabilities in:

- animal health and surveillance
- antivirals
- disease modelling and risk analysis
- molecular virology
- One Health
- plant health
- rural and First Nations community engagement.
- translational virology
- vaccine design
- veterinary epidemiology

In the last five years, more than 640 students have graduated with biosecurity capabilities.

We incorporate biosecurity learnings throughout our courses, recognising the importance of upskilling and educating future generations in this critical field. This includes programs in science, health, and our renowned veterinary science program, all housed within our state-of-the-art facilities.

Dr Scott Ison
Bachelor of Veterinary Science/Veterinary Biology

"My Charles Sturt degree opened the door to many opportunities, working in private rural mixed practice and government roles, such as the District Veterinarian with Local Land Services in Albury. I worked in Nepal for real-time foot-and-mouth disease training and in Indonesia for Food and Agriculture Organisation of the United Nations focusing on the management of foot-and-mouth disease and lumpy skin disease.

I have led animal biosecurity programs and teams of veterinarians and para-veterinarians through a number of roles in the NSW Government focusing on disease surveillance, biosecurity compliance, reporting, extension and engagement. I am currently the Program Lead for Animal Biosecurity and Welfare in Local Land Services, leading delivery of field veterinary services across NSW."

Biosecurity Hub initiatives

Research program at Gulbali Institute

The biosecurity research program at the Gulbali Institute addresses the rapid evolution and spread of viruses driven by globalisation and environmental changes. By leveraging interdisciplinary collaborations and innovative technologies, the program develops effective strategies for detecting and managing viral threats that safeguard public health and agriculture.

Focusing on One Health challenges, the program delivers practical solutions through research, industry engagement, and behavior change initiatives. It fosters global partnerships, educates communities on prevention, advocates for stronger biosecurity policies, and addresses environmental factors to improve resilience against viral outbreaks in Australia and the Indo-Pacific region.

THRIIVE at Gulbali Institute

The Gulbali Institute received $4 million from the Department of Education to establish the Training Hub for Regional Industry and Innovation in Virology and Epidemiology (THRIIVE). The project aims to protect Australia's industries from zoonotic and emerging viruses by developing skills in agricultural epidemiology and virology while also promoting public understanding.

Currently, THRIIVE hosts three PhD students and four postdoctoral researchers dedicated to advancing virology and epidemiology. Through strategic partnerships, THRIIVE plays a vital role in safeguarding the agricultural industry while fostering innovation and enhancing economic competitiveness.

THRIIVE focuses on four key research pillars:

- epidemiology and disease modelling
- molecular virology
- translational virology
- rural and First Nations community engagement.

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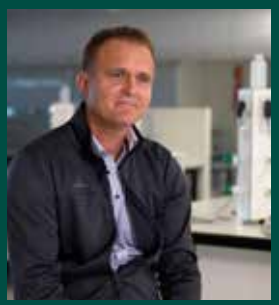
Gulbali Institute

Agriculture Water Environment

Professor Alan Cooper, a pioneer in Ancient DNA research, applies ultra-sensitive methods to monitor biosecurity threats by detecting initial signs of invasive species. His team focuses on affordable techniques for surveys across a network of Australian sites to identify any biosecurity species or pathogens.



Research led by Professor Jade Forwood leverages the advanced capabilities of the Australian Synchrotron to achieve atomic-resolution structures of viral:host interactions. This cutting-edge work is instrumental in developing antiviral therapies and vaccines, targeting key biosecurity threats such as Japanese encephalitis virus, foot-and-mouth disease, influenza, and African swine fever.

Biosecurity Training Centre

As a national leader in rural and regional education, we are renowned for excellence in training a highly competent and capable biosecurity workforce.

Through our partnership with the Department of Agriculture, Fisheries and Forestry, the Biosecurity Training Centre provides comprehensive training programs for frontline biosecurity personnel, encompassing foundational knowledge and specialised skills in biosecurity regulation across borders.

The Centre is driving the development of a skilled biosecurity workforce across the Asia-Pacific region, fostering collaborative relationships among government, academia and industry to strengthen biosecurity capacity in Australia and neighbouring regions, aligning with national priorities.

Our biosecurity training includes:

- 840 domestic students
- 20 international students on campus in Wagga Wagga
- 140 international students on their home soil
- Training conducted in Indonesia and Timor-Leste
- Country specific ‘train the trainer’ programs
- Focus on exotic diseases such as foot-and-mouth, lumpy skin and other high-risk animal and plant diseases.

eXtended Reality Centre - AgriPark

Our eXtended Reality Centre (XRC), as part of our AgriPark in Wagga Wagga bridges real and virtual worlds to create digital simulations that model real-world scenarios. This innovative technology develops smarter, faster, cheaper, and safer projects used for training purposes for government, by industry and for community engagement. These simulated environments allow for effective and engaging learning experiences, making learning more accessible, effective and relatable. The XRC has award-winning alumni with professional links and has delivered several biosecurity-related projects using cutting-edge technology for Government and industry clients. Clients include the Department of Agriculture, Fisheries and Forestry, Australian Farmers Federation, Local Land Services, Meat & Livestock Australia, REROC and ChemCert.

Visualisation of Exotic Pests and Diseases

The Xylella Fastidiosa project was commissioned by the Department of Agriculture, Fisheries and Forestry to educate the public using the latest 3D animation technology on the biosecurity risks associated with importing flora and fauna into Australia.

Research program at AI and Cyber Futures Institute

The Artificial Intelligence and Cyber Futures Institute (AICF) features cross-disciplinary expertise in data science, AI, and cybersecurity enhancing biosecurity capabilities. Focusing on regional and rural areas, AICF demonstrates how AI and technology developed 'off the beaten track' can effectively serve broader communities, establishing a competitive edge for Australia globally. The Biosecurity team at AICF employs cutting-edge technologies, like AI, robotics, machine learning, digital twins, and quantum computing, to better understand, identify, and mitigate biosecurity threats. AICF offerings including executive education, research, consultancy, and collaboration, foster a proactive stance on biosecurity.

Charles Sturt University

AI and Cyber Futures Institute

AGRIPARK AGRISCIENCES RESEARCH AND BUSINESS PARK

How to engage

Business development

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Learn more about our research and programs

→ info.csu.edu.au/research-biosecurity

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