



# Student Awards 2019

## The COVID Edition

June 2020

This report contains the experiences of 18 of our 2019 Student Award recipients.  
The remaining six awardees have postponed their travel due to COVID-19.



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**NINA MATSUMOTO, NSW - LAO PDR**



## AUSTRALIAN CAPITAL TERRITORY

### Contribution of Information Communication Technologies (ICTs) in smart practices of agriculture

**Nadeem Akmal, University of Canberra**

The Crawford Fund ACT Committee provided an award to Nadeem Akmal from the University of Canberra to travel to Nepal and work with the International Centre for Integrated Mountain Development (ICIMOD) within a project underway implementing 'ICT Smart' to promote the concept of environmentally friendly Climate Smart Agriculture to improve the livelihood of the smallholder farmers.

Agriculture in developing countries has structural problems like small landholdings, high production costs, and the lack of availability of innovative or latest information due to poor agricultural extension systems. As we found in our 2017 annual conference on The Digital Revolution in Agriculture, developments in ICTs, especially mobile phones and the internet, provide the opportunity for poor smallholder farming communities to get innovative and up-to-date information to reduce possible inefficiencies in production and marketing of commodities.

Project activities experienced by Nadeem were in the Kavre district, which has a varied climate from subtropical to temperate with substantial agricultural production that is a significant contributor to agricultural products consumed in Kathmandu. Climate-smart activities executed in Climate-Smart Villages (CSV) are Nutrient Smart, Water Smart, Crop Smart, Energy Smart, Future Smart and ICT Smart. In ICT Smart, an SMS notification system is created to deliver information weather information, technical advisory services and market information to farmers, reported Nadeem.

As well as the CSV initiatives, the communities are supported with other innovative technologies jointly executed by ICIMOD and the Center for Environmental and Agricultural Policy Research, Extension and Development (CEAPRED). All initiatives with technological packages aim to build resilience and improve the livelihoods of poor mountainous farming communities.

"To assess the contribution of ICT Smart component contribution, I conducted focus group discussions (FGDs), four for women and three for men separately with planning, access and translators provided ICIMOD and CEAPRED staff," said Nadeem.

Nadeem found that of those surveyed, agriculture contributes 65 to 70 percent of the household's income, with the majority of the households owning land between 4 and 12 ropanis in size (one ropani = 0.05 ha). Every household has livestock, and the majority of farmers meet their milk requirement from their own livestock. Regarding the availability of ICTs, a mobile is available at every household, but computer access is minimal.

He also found that all farmers are satisfied that the project interventions are compatible and make judicious use of minimal available natural and physical resources. Farmers receive technical advice information via SMS twice a week, which follow up training on certain technologies and this allows farmers to increase productivity and reduce cultivation costs.

Farmers also receive current market price information via SMS which enhances their bargaining power and is having a significant impact on improving household income. Ready market information also allows farmers to change their cropping patterns and timing according to consumer demand and prices.

Weather information is also provided twice a week to allow better planning and decision making, which also impacts income potential.

Nadeem had some very positive reports from the farmers involved.

"The majority of the farmers conclude that overall project interventions have increased their households' income from 50 to 100 percent with the half of this directly attributable to the ICT Smart component of the project," said Nadeem.

"They told me that before project they were buyers of commodities, but now they are sellers of commodities; and before the project, they were used to think about what to spend, now they think how to spend," said Nadeem.

"Findings of this research provide a solid base to transform my research findings into effective actionable interventions for my study area," concluded Nadeem.

"I would like to thank the Crawford Fund for providing this scholarship. Thank you also to my supervisor Dr Sandra Heaney-Mustafa for her continuous support and encouragement; the University of Canberra; the ICIMOD, RMS project team including Dr Arabinda Mishra, Laxmi Dutt Bhatta and especially Dr Abid Hussain taking time out of professional and family responsibilities to make my visit productive and pleasant; and finally, the CEAPRED management and field team."

### IRRI Production Course

**Sam Coggins, Australian National University**

Sam Coggins, a PhD student at the Australian National University and a recent ACIAR Graduate Research Officer, travelled to the Philippines to participate in the International Rice Research Institute's Rice Research to Production course after receiving a Student Award from the Crawford Fund's ACT Committee. This is his experience.

"The course enabled me to realise three desired outcomes. Firstly, it enabled me to develop knowledge critical to the development of the digital fertilizer advisory tool I'm co-developing for rice farmers in Myanmar. This critical

knowledge includes rice agronomy, gender research and digital extension,” said Sam.

“Secondly, the course enabled me to interact face-to-face with the scientists I’m collaborating with for the digital fertilizer advisory tool. I had not met any of them face-to-face before, so the multiple in-depth interactions were invaluable for developing relationships and a mutual understanding with them,” he said.

“Finally, the course enabled me to connect with fellow agriculture for development enthusiasts, both IRRI employees and course participants. I am confident these valuable networks will be sustained for a very long time,” said Sam.

The course featured lectures and practical activities across a diverse range of disciplines applied to rice science including entomology, plant pathology, drone technology, plant physiology, breeding, gender research, videography, digital extension and weed science. Eighteen people participated in the course from 10 countries.

“I was concerned the course was going to go into excessive technical depth, but this did not happen at all. The researchers that presented were very focused on ensuring the knowledge they delivered was practical and accessible,” said Sam.

The IRRI course participants travelled to the Philippines from 10 countries.

“The course was fantastic in so many ways. The course coordinators, Amelia Henry and particularly Josh Cobb, invested so much time, passion and energy into improving the course based on participant feedback. The course provided an excellent cross-section of practical knowledge surrounding rice research for development - genuinely research to production,” said Sam.

“The course was very hands on with plenty of opportunities to get out of the lecture room and into the field, and the course participants were from highly diverse backgrounds and this created rich opportunities for networking and cross-cultural understanding,” said Sam.

“I am deeply grateful to the ACT Crawford Fund Committee for creating this opportunity. It accelerated the development of my capacity as well as the digital fertilizer advisory tool we are developing for rice growers in Myanmar. Thank you,” concluded Sam.

The Crawford Fund’s NSW and ACT Committees have partnered with IRRI since 2009 to support a dozen scholarships for the next generation of university students to gain a deeper understanding of all facets of rice research and production as part of this short-course held annually and involving attendees from all over the world. We are also proud to have our Queensland Committee chair, Dr Kaye Basford, on the IRRI Board.

## NEW SOUTH WALES

### Modelling environmental impacts of cattle grazing in oil palm plantations in Indonesia

**Jori Bremer, University of New England**

My PhD project falls within the ACIAR IndoBeef program, more specifically the PalmCow project, which aims to ‘Develop profitable smallholder beef cattle production in association with oil palm plantation systems’.

A growing population and increasing standards of living in Indonesia have led to a growing demand for animal protein, especially beef. Local beef production is however constrained by limited feed and land resources. The integration of cattle in the 12 million hectares oil palm plantation is one suggested solution: the oil palm understory (commonly viewed as weeds by plantation managers) is used as feed, and no additional land needs to be converted to agriculture. At the same time, cattle grazing could reduce the need for labour and agrochemicals for weeding and provide farmers with an additional source of income. Overgrazing, however, can lead to soil degradation and the proliferation of unpalatable weeds. Cattle management is therefore a crucial determinant in the sustainability of cattle-oil palm integration.

Receiving the Crawford Student Awards gave me the opportunity to conduct interviews with smallholder farmers using oil palm understory as cattle feed. I asked about farmers’ chosen cattle management model in the oil palm plantation, the reason behind the adoption of this management model, and their opinions on cattle-oil palm integration.



**JORI BREMER, NSW - INDONESIA**

Forty-two smallholder farmers owning cattle participated, in four villages around the Buana Karya Bhakti commercial oil palm plantation in South Kalimantan. It was difficult to find respondents at first and I was resigned to the fact that I would probably not reach the target number of interviews. However, as often happens in Indonesia, everything fell into place on the last day of interviews, when 18 smallholders showed up. It was then a challenge to collect all the required information without making them wait for too long! My time in Indonesia certainly taught me about the benefits of being flexible and going with the flow, while trusting everything will work out in the end.

There are three main cattle management models in the area: continuous grazing, daytime grazing and no grazing. Interestingly, cattle management is controlled by the risk of cattle theft. Cattle are kept in kandangs (pens) to keep them safe from thieves. If the farmer can watch the cattle during the day, the cattle are allowed to graze outside. The smallholders continuously grazing cattle do so because their cattle are too difficult to handle and cannot be kept in kandangs.

Whereas I expected the application of agrochemicals in the plantation (fertilizer and herbicides) to be a deterrent for cattle integration in oil palm plantations, it was not viewed as a problem by smallholders. Oil palm plantation workers usually warn these cattle farmers about agrochemical application zones, which can then easily be avoided.

Juggling an 18-person interview: In these situations it was important to be flexible and adapt to the circumstances, to make sure everyone got to tell their story.

Cattle are considered one of the possible pathways for improving livelihoods and living standards, while at the same time being a form of income storage for times of need. This fieldtrip made me realise the importance of oil palm plantations for cattle farmers in the regions: due to the scarcity of alternative feed resources, the availability of oil palm understory is critical for cattle production. It is therefore crucial to develop sustainable grazing guidelines for cattle in oil palm plantations, so that present and future grazing can be managed sustainably and easily by smallholder farmers. This reinforces the importance of the IndoBeef program.

I am grateful to the Crawford Fund Student Awards for giving me the opportunity to learn about cattle management in these cattle-oil palm integrated systems. I now have a better understanding on the local conditions and I have a better view on realistic research pathways, crucial information for the continuation of my PhD as well as for building the knowledge base on cattle-oil palm integrated systems.

### [What is the economic feasibility of small holder sheep production in Samoa?](#)

### [How adopting a value chain approach can identify the existing challenges facing the Samoan sheep meat sector?](#)

### [Prevalence of gastro-intestinal helminth parasites of sheep, cattle, pigs and dogs in Samoa](#)

**Charles, Callaghan, William Davies, and Rebecca Owen, Charles Sturt University (COMBINED REPORT)**

Three students from Charles Sturt University travelled to Samoa to complete the practical component of their honours studies in mid-June, 2019, for six weeks as part of an ACIAR project, Improving Small Ruminant Production and Supply in Fiji and Samoa. Charles Callaghan and William Davies, were Bachelor of Agriculture Business Management students, and Rebecca Owen, was a Bachelor of Animal Science student. They were each successful in their applications for a Crawford Fund Student Award and this is a combined report on their award experience in the Pacific.

The students departed Wagga Wagga a little anxious about the experience ahead, accompanied by supervisors, Dr David Jenkins and Emma Hand.

“While all three of the students had travelled overseas before, some to developing countries, none had completed their own research projects, and certainly not in a developing country setting. This offered the students an incredible opportunity for personal growth and development,” reported Emma who was recently involved as a RAID member in a Crawford Fund NextGen panel at the National Association of Agricultural Educators.

“The students were thrust into a steep learning curve, having to learn quickly about their chosen topics, research principles and the Samoan culture and landscape,” she said.

Being Ag Business students, Charles and William focused on the farm management and feasibility of the Samoan sheep industry. For Charles’ dissertation, titled “An Investigation into the Economic Feasibility of Small Holder Sheep production in Samoa,” he interviewed almost all sheep farmers in Samoa, with the help of the local Ministry of Agriculture and Fisheries, Animal Production and Health Division (APHD) staff. Due to language barriers associated with interviewing non-English speaking local farmers, Charles was able to develop his communications and interpersonal skills greatly.

Charles found that sheep production in Samoa was not currently feasible, with the major constraints centred around inadequate nutrition and dog attacks, with some farmers losing up to 50% of their flock in one night. He recommends that more investigations are needed into improved pastures and the development of supplementary feeds which can be produced locally. Charles was awarded class 1 honours.

William investigated the challenges faced by the Samoan sheep meat value chain for his dissertation “How can existing challenges facing the Samoan sheep meat sector be identified using a value chain approach?”. William conducted an amazing 113 interviews in his six weeks in Samoa with sheep farmers, wholesalers, importers, retailers, restaurants and resorts, and consumers, overcoming many communication and cultural barriers to complete this task. He also showed great resilience and persisted, despite these challenges, to achieve his research aims. William was awarded



class 2a honours.

Being an Animal Science student, Rebecca chose a study area more closely related to sheep production with her dissertation titled “Gastrointestinal Nematodes of Sheep in Samoa”. Rebecca joined Charles on his visits to Samoan sheep farmers and collected faecal samples from a huge 905 sheep; this is estimated to be around 70-80% of the total Samoan sheep population.

She also showed incredible resilience, overcoming a number of typical developing country challenges while completing her laboratory work, including power non-functional microscopes, power and water outages with the majority of her “laboratory” work being completed in hotel bathrooms.

Rebecca recommended that the APHD increase their extension provision to Samoan sheep farmers on the control and management of gastrointestinal parasites. Rebecca was awarded class 1 honours.

“Through this scholarship, not only have the three students undergone significant personal development, which will no doubt enhance their careers and their contribution to agriculture in the future, but a strong relationship with the existing relationship with the APHD has been strengthened. These investigations have and will significantly contribute to the ACIAR Fiji and Samoa small ruminant project, which is in initiation,” concluded Emma.

### Zoonotic and high-impact production animal diseases in Laos: socioeconomic impact and epidemiology at the human-animal interface

**Nina Matsumoto, University of Sydney**

We now deliver to you the experience of PhD student Nina Matsumoto from the University of Sydney who worked as part of the ACIAR project, “Enhancing transboundary livestock disease risk management” in Lao PDR a few months ago, with a particular focus on this year’s devastating African Swine Fever (ASF) outbreak.

Smallholder pig farming in Laos is a vital income source to provide food security and financial resilience to low-income communities. Pigs grow quickly and can be slaughtered for home consumption or sold for a financial boost in the short term, creating resilience against shocks that might otherwise lead to food insecurity. Smallholder livestock keeping presents unique challenges to disease outbreak control, as most farms carry small numbers of pigs, with minimal biosecurity practices and financial inputs.

In 2019 an outbreak of ASF spread across the country, starting in the Southern provinces of Salavan and Savannakhet. This outbreak started in 2018 in China, subsequently also spreading to Vietnam, Cambodia, Myanmar, the Philippines, Timor-Leste and Indonesia.

“This work provided one of the first opportunities for investigators to visit an ASF affected region on the ground in South-East Asia to understand the spread of the disease and the impact it is having on vulnerable communities,” said Nina.

ASF is a moderately contagious disease that is highly resistant in the environment. Smallholder, backyard operations are an identified risk factor for the disease, yet the reports on the epidemiology of ASF within these communities are rare. In Laos, ASF spread to 13 provinces, and 39,000 pigs died or were slaughtered across 165 outbreaks.

During the 2019 incursion of ASF, the Lao Department of Livestock and Fisheries (Lao DLF) resources were primarily targeted at control and education measures across the country. They identified the need for a more robust disease outbreak investigation as well as preliminary analysis of the social and economic effects of the outbreak. As a result, they proposed that Nina perform a structured epidemiological analysis.

“The Crawford Fund Award provided me with the flexibility to organise this trip under reasonably short notice, as the Lao DLF requested this activity in late July and wanted it to occur in September/October,” said Nina.

“Understanding how disease spreads through low-input communities will be of great value for smaller communities with backyard or free-range pigs, interfacing with feral pig populations in Australia too,” said Nina.

“The data collected will later be utilised to build a disease simulation model over which the investigators can evaluate



**WILLIAM DAVIES, CHARLES CALLAGHAN AND REBECCA OWEN, NSW - SAMOA**

interventions and financial losses/gains. Computational disease simulation activities will be of enormous value to NSW and Australia as it can provide a framework around which to build a similar model for Australia,” she added.

Nina interviewed affected and unaffected pig farmers in Laos and presented her findings to them as part of a training seminar. Participants were also given t-shirts as part of an ASF information campaign.

Nina visited the outbreak district in Savannakhet and interviewed both affected and unaffected villages. Preliminary data suggested that ASF severely impacted the pig population in affected villages. Further analyses about the outbreak, disease simulation modelling and bioeconomic modelling is in the pipeline to better understand potential measures that will protect the existing population and allow for safe repopulation.

“By supporting this disease outbreak investigation, The Crawford Fund supports capacity building for the local field staff, who received biosecurity and disease investigation training. And, it provided me with the opportunity to observe ASF affected villages in the field, providing a unique perspective which will be of benefit to Australia in the event of an exotic disease outbreak,” said Nina.

“During the visit we interviewed numerous local stakeholders, including villagers, village leaders and veterinary workers to gather information about smallholder pig management practices, marketing activities and diseases of the area,” she said.

“Using this data, we will be able to begin risk factor analysis and spread rates of ASF through smallholder villages and also understand how smallholder villagers perceive the disease, describe the symptoms, and determine local terminology which can all inform future extension and capacity building activities relevant to the local smallholders,” she said.

“I would like to thank The Crawford Fund; my PhD supervisory team; ACIAR; The University of Sydney, School of Veterinary Sciences; Mahidol-Oxford Tropical Medicine Research Unit; and, Lao Department of Livestock and Fisheries – in particular, the exceptional team at the Savannakhet Provincial office for facilitating this fieldwork,” she concluded.

### IRRI Production Course

#### **Nancy Sajit, Charles Sturt University**

Nancy Saji, a PhD student at Charles Sturt University, was the recipient of a Student Award for a Rice: Research to Production Course scholarship in 2019.

The Crawford Fund's NSW and ACT Committees have partnered with IRRI since 2009 to support a dozen scholarships for the next generation of university students to gain a deeper understanding of all facets of rice research and production as part of this short-course held annually and involving attendees from all over the world.

“I was very fortunate and grateful to be awarded a scholarship by the NSW Crawford Fund to attend the rice research to production course organised by International Rice Research Institute (IRRI) at their headquarters in the Philippines in 2019,” said Nancy.

IRRI is the world's leading rice research organisation and it works to reduce poverty and hunger through rice science; improve the health and welfare of rice farmers and consumers; and protect the rice-growing environment for future generations. We are proud to have our Queensland Committee chair, Dr Kaye Basford, on the IRRI Board and Australian, Dr Matt Morrell, is the IRRI Director General.

Working with in-country partners, IRRI develops advanced rice varieties that yield more grain and better withstand pests and disease as well as flooding, drought, and other harmful effects of climate change.

“The program aimed to teach the participants about the fundamentals of rice production, obtain hands-on skills relating to rice production and breeding, gain new knowledge concerning diversity among rice varieties, and raise awareness related to food security,” said Nancy.

“This course was delivered through a combination of classroom lectures, group discussions and field sessions. Moreover, the course also provided the attendees with a great opportunity to network, hear about agricultural updates and developments from an international perspective and potentially form international collaborations,” she said.

The course also includes a visit to the International Rice Genebank, maintained by IRRI, which holds more than 130,000 samples – including cultivated species of rice, wild relatives and species from related genera. The genebank is the biggest collection of rice genetic diversity in the world.

## **NORTHERN TERRITORY**

### Identification and management of bacterial wilt diseases in banana

#### **Jane Ray, University of Queensland**

Jane Ray, a PhD Candidate at the University of Queensland, travelled to Costa Rica as part of a project to identify and manage bacterial wilt diseases in bananas after being awarded a Crawford Fund Student Award from our Northern Territory Committee. She was supported in-country by the University of Costa Rica.



Banana (*Musa* spp.) is the most consumed fruit crop globally and an important crop in the developing world providing a source of food and income throughout the year reducing the risk of food insecurity.

Bananas are susceptible to three important bacterial wilt diseases that reduce productivity and quality. These diseases are Moko, blood disease and banana *Xanthomonas* wilt and they all cause similar symptoms of leaf wilting, vascular discoloration and fruits that remain green on the outside with rotten, discoloured inedible pulp. These diseases are absent from Australia and are of concern to the Australian banana industry.

“Our findings during this project are of value to the Australian banana industry which has a farm gate value of \$600 million. These lethal bacterial wilts are exotic to Australia and are listed as high priority pests in the banana industry biosecurity plan. An incursion would likely result in a costly eradication program while the establishment of Moko in Queensland alone has been estimated to cost the industry \$100 million,” said Jane.

Biosecurity is fundamental to the success of future banana production in the Northern Territory, an industry that has already overcome major disease threats of banana freckle and Panama disease tropical race 4 (TR4).

Moko disease originates from South and Central America and has also been recorded in the Caribbean Islands, the Philippines and Malaysia; whilst banana blood disease originates from Indonesia.

“Blood disease is an emerging threat to banana production in Southeast Asia and beyond and is the topic of my PhD research,” said Jane.

“This Crawford Fund Student Award project provided a unique opportunity for me to visit Dr Luis Gómez Alpizar from the University of Costa Rica to see Moko disease in the field for the first time,” she said.

Comparing, photographing and documenting the difference between strains of Moko and blood disease would provide valuable information for diagnosticians and help to speed up accurate diagnosis for the different banana bacterial wilts explained Jane.

“In Costa Rica we visited banana plantations, inspected Moko eradication sites, collected samples of symptomatic banana plants, isolated the bacterium causing Moko, examined cultural morphology and extracted DNA of the pathogen. The National Banana Corporation of Costa Rica (Corbana) also provided DNA from their Moko culture collections. The DNA returned to Australia was used to validate the molecular diagnostics for both Moko and blood disease,” said Jane.

“During various meetings, I had the opportunity to update scientist on my current research on blood disease in Indonesia. Sharing valuable insights about banana blood disease, its biology, symptoms, current dispersal and diagnosis was also of value to the scientists and banana producers in Costa Rica,” said Jane.

“Gaining an understanding of methods used in Costa Rica to manage the disease in commercial banana plantations was enlightening and learnings will be applied to my current PhD research on the biology of blood disease in Indonesia,” she said.

“My PhD research is part of a large program on emerging banana diseases funded by Horticulture Innovation Australia under the leadership of Prof André Drenth. Dr Lilia Costa Carvalhais, who is part of Prof Drenth’s banana research team, led this part of the project investigating Moko in Costa Rica,” said Jane.

Costs associated with this activity were also funded by the National Plant Biosecurity Diagnostics Network grant for Moko Diagnostic Protocol Development, Horticulture Innovation Australia project BA 16005, and The University of Queensland.

“Because of this opportunity, I have gained unique practical experience and learned from an experienced team of plant pathologists about the management of this disease. I have been able to adopt and apply the learnings to my current ongoing research project on the biology of blood disease in Indonesia,” said Jane.

“This Award has enabled an exchange of ideas and knowledge across vast geographic distances that will help to further the research into the control and management of the banana bacterial wilts, and it has allowed me to develop valuable networks for future projects,” concluded Jane.



JANE RAY, NT - COSTA RICA

## QUEENSLAND

### Cassava disease screening: evaluation of diverse CIAT germplasm collection for resistance to witch's broom

**Rebekah Ash, University of Queensland**

In this report, Rebekah Ash from the University of Queensland explains her trip to Lao PDR to work on a project focused on developing cassava production and marketing systems to enhance smallholder livelihoods which involves the Centre for International Tropical Agriculture (CIAT) and is supported by the Australian Centre for International Agricultural Research (ACIAR).

Bek's involvement was more specifically in the evaluation of cassava germplasm for resistance to witch's broom disease (CWBD) but we were pleased to read in her report on the visit that her experiences and learnings extended far beyond these boundaries.

Bek noted, "I learnt that the way we measure success is not transparent across all situations, but rather, it is determined by our circumstances. This is something I will take away with me not just in the agriculture sector but many walks of life."

"For me this was an important project to be involved in and exposed to as cassava is one of the world's most important staple foods, sustaining approximately one fifth of the global population and disease is one of the largest factors currently affecting its production."

Bek's first week at CIAT involved working alongside Dr Roosevelt Escobar, a colleague from CIAT headquarters in Columbia to build a growing tunnel and greenhouse to assist in rapid multiplication of disease-free cassava at the field station, Na Pok.

She assisted Dr Wilmer Cuellar, a virologist also from CIAT headquarters, in trialling a grafting method (chip bud grafting) to transfer the phytoplasma from CWBD from an infected scion/bud to a clean rootstock. Then, they conducted a polymerase chain reaction (PCR) diagnostic on cassava mosaic disease (CMD) with clean and infected samples of cassava using the newly developed dipstick technology. As part of this process they showed a Lao colleague the PCR process and dipstick technology.

"One of the biggest takeaways for me was the importance of sharing skills with as many in-country scientists as possible and developing tailored processes and technologies that match resource and skill availability," said Bek.

"Although Laos currently has no reported cases of CMD, it is important for researchers in the region to be able to test their samples using PCR methods rather than purely off visual symptoms."

"At the beginning of my final week, I harvested a trial with Dr Imran Malik and Lao colleagues. We spent two days in the field taking a number of measurements before and after harvest that will later be analysed to present the results."

Rebekah travelled to the southern province of Salavanh to attend a workshop on cassava value chains and enhancing productivity, quality and market share. In the workshop, she learnt more about the 'big picture' of cassava in Laos, particularly from CLEAN (creating linkages for expanded agricultural networks) who are running a large project to increase production by reducing post-harvest losses in horticulture and developing linkages to increase demand for clean horticulture in domestic, sub-regional and global markets.

"Travelling to the workshop we talked to a number of cassava buyers and processors about how they came to choose a particular buyer and assess premium prices for organic cassava. We also had the opportunity to show farmers images of CMD and ask whether they had seen any symptoms in their field," she said.

"My experience in Laos was a steep learning curve. From the agronomy and molecular genetics of cassava, to visiting facilities and people across the whole supply chain and understanding the difference in approaches to moving forward in a project between Australia and Laos, it was an invaluable learning experience," said Bek.

"My experience and skills working with cassava is transferable to my future work and research in Queensland. During my time in Laos and learning more about the wide range of uses for cassava, I have seen an opening for further research into varieties of cassava that may be suitable for growing as a sustainable feed source in livestock production in Australia," said Bek.

"There are a number of people who contributed to my fantastic experience. I would like to thank Jono Newby from CIAT for helping organise my trip and creating endless learning opportunities for me during my month. Alongside Jono, his colleagues at CIAT all welcomed me into their research projects. This experience would also not have been possible without the help of Mark Dieters from UQ who connected me to CIAT and Jono Newby."

"Finally, I would like to acknowledge the Crawford Fund and the QLD committee for the funding that made this project possible. It has been an invaluable experience and my gratitude extends beyond words," concluded Bek.

Epilogue: Prior to COVID-19, Bek secured a placement in Indonesia for seven months studying and working. She credits the links she made in Laos during her Crawford Fund award experience for both the opportunity, and the instant connections and warm welcome she received on arrival in Indonesia.



## Increasing phosphorus efficiency in tropical cropping systems

**Bianca Das, University of Queensland**

Bianca Das travelled to Kenya as part of her PhD research with the University of Queensland and the CSIRO. In Kenya, Bianca was supported by staff at the Alliance of Bioversity International and the International Centre for Tropical Agriculture (CIAT). Bianca has written the following report on her trip:

Firstly, let's clarify the question on everyone's lips: Are maize and corn the same thing? Well, yes and no... Corn is a type of maize (*Zea mays* L.). For many Australians, Kiwis and North Americans, we're thinking about sweet corn, one of the many different types of maize. In Kenya, the most common type of maize is white and starchy with waxy skin and is used to make maize flour, a staple food all over Africa.

So, this blog isn't about the quest to decipher what corn really is, rather it's about what I couldn't have learnt without travelling to Kenya for my PhD research on a Crawford in Queensland Student Award. This award allowed me to see firsthand the impact of soil phosphorus deficiencies on cropping systems in sub-Saharan Africa, and build invaluable research networks and genuine friendships with the staff at the Alliance of Bioversity International and the International Centre for Tropical Agriculture (CIAT).

Walking through the trials, I got a feel for the many different treatments effects and took photos to document this. I could closely examine nutrient deficiencies in two crops I hadn't seen up close in the field before – soybean and maize. I also learnt about the locally used legume crop called tephrosia [*Tephrosia candida* (Roxb.) Dc.], a green manure in rotation with maize in one of the trials to explore the potential to sequester carbon into the soil.

Along a path next to the trials, I bumped into an elderly man who lived close by. In broken English he thanked me profusely for the work I was doing. I immediately tried to explain, "Well, actually I didn't do anything I'm just here to have a look..." but unable to speak any Swahili, I could only smile and accept the praise. I then started to think about how much value the local community placed on these trials. I later learnt these trials also serve as a demonstration facility for local farmers and stakeholders to observe and learn new practices for sustainable intensification and climate smart agriculture. I now understand that this research is critical to all facets of this community.

Recording field data with Peter Bolo and his colleagues helped me realise just how much work is done by hand and how this impacts the data collection and local agricultural practices. During the heat of the afternoon, school children next door sang soothing hymns, keeping us going into the early evening. After working closely with my new colleagues in the field, it was easy to feel connected and ask questions about agriculture and culture in the region. We explored topics of different types of cash crops (mainly sugar and maize), local family dynamics, and the strong cultural connection to the Christian faith, local pride and identity in this region.

Being a Kiwi, I thought I was used to a friendly culture, but Western Kenya is "next-level friendly." One morning before we leave, I smile to security guard in the car park and jump in the ute, I am focused on the trials. He says something to Peter, half-jokingly Peter says, "There is a problem, he is asking why you did not stop to say hello." Completely stumped by my rudeness, I hop out of the car to shake his hand and say hello. What struck me after a few days of staying in the region was the genuine kindness and warmth of the culture.

Trucks, school buses, vans and boda bodas (motorbike taxis) on the main road have a special code of overtaking one another that I don't quite understand. Meanwhile sheep, goats and cattle casually graze weeds between small fields of maize, sugar cane, forage sorghum, banana and plantain. After crossing the equator every day, I eventually convince our driver to stop and let me take a photo.

The main city Kisumu is perched on the edge of Lake Victoria, the largest lake in Africa. Visiting the markets in Kisumu was great to see the local grains, plants and fruit but more interestingly, people didn't know how to call out to me to buy their things. Sometimes I was Wahindi and sometimes I was Mzungu which was very amusing to my colleagues. I got to taste the local maize; when boiled with salt it was waxy, starchy and bland in flavour – can't say I liked it that much. But, the ugali (steamed maize flour dough), I particularly enjoyed when eaten with the local fish.



BIANCA DAS, QLD - KENYA



Upon arrival at Alliance of Bioversity International and the CIAT Regional Office for Africa in Nairobi, I was enthralled by the diversity of expertise and research activities. I spoke with experts such as Dr Job Kihara and Dr Birthe Paul who have both worked on the trials for many years and are usually very busy and often travelling internationally. I presented my thesis work to staff to gauge their perspective on my work and explain what information I needed to model the trials. We then worked together to sift through the files of existing data to locate the information I needed. I would not have been able to gain access to this data without actually being in Nairobi.

To “value add” to my trip, I joined a group visiting the Thika Field trial, about 40 minutes’ drive north of Nairobi. This trial focused on mixed cropping systems for maize-legume-pasture rotations for a large dairy project where the effects of drought were evident: a stark difference to Western Kenya where annual rainfall is 1700 mm. I also visited two local laboratories that Alliance of Bioversity International and CIAT collaborate with, the International Livestock Research Institute (ILRI) and a local commercial lab CropNuts. This was an excellent opportunity to share contacts and establish collaborations, should I get the opportunity to return and collect field data at a later stage during my PhD.

In just three weeks, I gained a snapshot of life in Kenya which gave me firsthand understanding of phosphorus deficiencies in the field, granted me the ability to source the data I needed to build my PhD project, showed me the global significance of Alliance of Bioversity International and CIAT’s long term trials in Western Kenya, and allowed me time to connect with researchers and build quality networks for my career in international agriculture.

Lessons learnt:

- The Western Kenya long-term trials are globally significant for research in agriculture, particularly for testing out new practices in nutrient management, conservation agriculture and climate change adaptation research. They have a positive impact on local community by providing knowledge sharing, collaboration and employment.
- Agricultural modelling is not just theoretical. Visiting the trials added context and meaning to the spreadsheets I work with. I need to include a “so what?” aspect to make my PhD research relevant for sub-Saharan Africa by incorporating manure and mixed intercropping systems in small holder systems.
- A backup database system and a legacy mindset for data is key for research projects to continue to provide new research after they are finished.
- When you’re working in a new country and culture, it is important to ask open questions, listen, asking more questions and listen again. Don’t just make “western” assumptions.
- Offer your expertise in any way possible to help collaborate and form new projects. Be generous, share contacts and knowledge. Be clear with your communication, intentions, and goals.
- Seek to understand, not be understood. Learn to navigate new organisational structures, projects and funders. Learn some of the language, even if you have a short time. Learn about the ambition and drive of the younger generation. Visit local museums and try to understand the history of the people and how it relates to agricultural activities.

### [Silage production using stems/leaves of Cassava and Broom Grass, using Lactic Acid Bacteria \(LAB\), to assist with breakdown of anti-nutritive properties](#)

#### **Luke Dieters, University of Queensland**

Luke Dieters from the University of Queensland travelled to Luang Prabang, in the Lao PDR earlier this year – his name may be familiar as we sent out a few tweets when Luke was in-country. His focus was to determine whether waste products from common plants could be used to create improved quality feed for goats. His visit included support from partnerships with the Crawford Fund, the Lao-based Northern Agricultural and Forestry College (NAFC), The Australian Centre for International Agricultural Research (ACIAR) and the University of Queensland (UQ).

Luke conducted preliminary testing of silage made from biomass of cassava and broom grass, with and without the addition of Lactic Acid Bacteria (LAB). The aim of the research was to provide an alternative source of feed for animals in the dry season and explain to NAFC staff and students the silage-making process.

“The work undertaken during my visit to Lao PDR involved the development and preliminary evaluation using feeding studies on goats and cattle, in addition to simple chemical analysis of the silage,” said Luke.

“The Crawford Fund allowed me to not only travel to Laos but also gain experience that I would never have been able to afford personally,” said Luke.

Perennial crops such as broom grass and cassava, can provide significant benefits to farmers as a cash crop, but also produce significant biomass from their stems and leaves that are not fully utilised. This under-utilised plant biomass was investigated by Luke for silage suitability to allow farmers to feed animals. Silage success would allow for a reduction in feed expenses and a greater profit, which in turn will improve livelihoods.

“New techniques that improve productivity of animals and farms not only allow for improved income so that children get a better education but will also benefit the entire country from the ground up,” said Luke.

Silage is an important long-term feed storage method for cattle, goats and sheep that can be created in the wet season, and then utilised in the dry season as a supplementary feed source. Silage can be produced easily from chopped plant biomass that is then sealed in containers which then undergoes fermentation by LAB. Inoculants, like LAB, are commonly used to produce silage in Australia, however in Lao PDR this was a new technique which all the

students and some of the teachers had not experienced previously.

The project was also extended to include black sugarcane, napier grass and maize plants (post-harvest) upon request by NAFC. These added treatments were especially important to emphasise that any plant can be used as silage.

"Further testing with more nutrient content analysis needs to be done on each of these treatments as well as different treatments using alternative silage mixes. However, as a preliminary test of silage quality and palatability this project was a success," said Luke.

"This Award has given me significant experiences in research, teamwork, overseas travel, and professional contacts with staff both here in Australia but also overseas in Laos. This will help me to further my future goals and career and has given me a deeper appreciation for work that is being done to improve foreign agricultural practices but also has given me more knowledge about goats, silage and agricultural practices here in Australia," said Luke.

"Further, as part of my stay I participated in teaching basic English classes in addition to experiencing many other farm systems, such as fisheries, frog farms and mushroom farms, which allowed for an expansion of my knowledge and experience base. This entire research trip has been of great value in furthering my practical knowledge and experience, and at the same time as making me a more desirable candidate for any future tasks that I hope to achieve," said Luke.

"This project also further strengthened the ties between not only NAFC and UQ, but also created professional international contacts for me, and strengthened the joint research cooperation between Australia and Laos," said Luke.

"I would like to acknowledge and thank Dr Mark Turner, Dr Mark Dieters, Dr Elham Assadi Soumeh and Ed Qualischefski from the University of Queensland; Dr Outhai Soukhy and Yalao Lyfong from The Northern Agricultural and Forestry College; and, Professor Bob Lawn from the Crawford Fund QLD Committee," concluded Luke.

## SOUTH AUSTRALIA

### Engaging youth in agricultural entrepreneurship in Laos

#### **Manithaythip Thephavanh, University of Adelaide**

Manithaythip Thephavanh, a PhD student at the University of Adelaide, School of Agriculture, Food and Wine travelled to Laos as part of her research investigating the factors which influence the intention of Lao youth to engage in small and medium scale agricultural entrepreneurship as a career, and the rural opportunities available to them. Not only was Manithaythip the recipient of our SA Committee's Student Award in 2019, she is also the recipient of ACIAR's John Allwright Fellowship.

Manithaythip's project data collection was conducted in Vientiane, the capital, and in the southern province of Champasak. She applied a combination of social sciences techniques including youth career perception and intention surveys, semi-structure interviews, focus group discussions, and key informants interviews.

"The Crawford Fund Student Award allowed me to greatly increase the scope and quality of my research, by allowing me to include a second province in my investigation, adding a new dimension to the analysis and greatly increasing the number of participants to over six hundred," said Manithaythip.

"To have Champasak province as a second site for my research allowed me to explore a new environment, capture different perceptions of high school and university students and young farmers in the south, and meet with many interesting people who shared me a lot of useful information and insights for my personal development and research," she added.

"The data are currently being processed and it is clear that these improvements will greatly increase the validity of the findings. It has also been a valuable learning experience for me, as my research put me in contact with many career decision-makers, young farmer-entrepreneurs, local experts and Australian researchers for international agricultural development," she said.

"This funding has helped me to better achieve my PhD goal of identifying the drivers for youth to engage in agriculture,



**MANITHAYTHIP THEPHAVANH, SA - LAO PDR**

which is poorly understood,” she said.

The Lao People's Democratic Republic (Laos) is a nation whose population is both highly rural and also the youngest population in Asia, with a median age of 21.9. Agriculture is a significant sector upon which approximately two-thirds of Laos' rural population are highly reliant for subsistence and income. Even amongst urban residents, nearly half of households engage in some form of agriculture.

Although approximately 75% of young people in Laos work in the agricultural sector, only half do so with market interactions, and with fewer off-farm opportunities compared to its regional neighbours, there is a danger of rural youth being left behind as Laos modernizes, unless they can transition to more market-oriented agricultural production explained Manithaythip.

“Accordingly, my PhD research project is investigating the factors which influence the intention of Lao youth to engage in agricultural entrepreneurship as a career, and the rural opportunities that exist for them,” she said.

With the help of the Lao Farmer Network, the biggest network of farmers groups in Laos (representing more than 4,000 farmers nationally), 75 individual young farmers-entrepreneurs were contacted for semi-structured interviews and three focus group discussions were conducted with other young farmers-entrepreneurs.

“Spending time with and interviewing 75 young farmers-entrepreneurs in the central and southern Laos has reshaped my view about young people and agriculture,” she said.

“The impression I formed when talking to young farmer entrepreneurs was that they are not forced to engage in this agricultural entrepreneurship as a career because of a lack of options; they are doing it because they are passionate about it,” said Manithaythip.

“During the interview, when I asked young farmers-entrepreneurs what motivates them to select their career, the most common response was that they “love it” or have a passion for it; most of the time when I ask do they think of changing their career, they said no. This contradicted my initial expectation that young people may work in agriculture due to a lack of other options or as a reasoned response to other environmental factors or pressures, rather than a result of their attitude,” she said.

“Another surprising insight that I gained from conducting youth career perception and intention survey with high school and university students is that most of them have a positive attitude toward agricultural entrepreneurship as a career,” she said.

Further interviews were held with policy decision-makers, senior researchers and development practitioners from government agencies, commerce and industry, universities and the the private sector.

“Now that I have returned from Laos, I will apply qualitative research software (Nvivo) to identify the key psychological and environmental themes around the opportunities that may or may not exist, and the perceptions surrounding them,” she said.

“Being present in southern Laos for the Crawford Fund-supported activities also provided me with a worthwhile opportunity for me to get involved with a visiting Australian researcher, Dr Davina Boyd, who is working on an ACIAR project. She is a career social scientist and being able to join her on her research and contribute to it has given me valuable experience that I was able to apply in my own research,” said Manithaythip.

“Conducting fieldwork in Laos for this research has resulted in me having a positive experience with many like-minded people, and building up several new networks both inside and outside of Australia,” she said.

“I am confident that the activities and partnerships that the Crawford Fund enabled during my trip to Laos will lead to high-quality research from The University of Adelaide that will strengthen the institution's output and reputation for agricultural research for development,” concluded Manithaythip.

## TASMANIA

### [Investigation of the development of commercial vegetable and fruit production in Timor-Leste](#)

**Oliver Gales, University of Tasmania**

Oliver Gales from the University of Tasmania recently travelled to Timor Leste to be involved in an ongoing program supported by the Crawford Fund aimed at improving the livelihood and education opportunities for communities in Timor Leste. Since his return, Oliver has been awarded a Rhodes Scholarship and he will be the first ever to receive the scholarship to study sustainable agriculture. On receiving the scholarship, it was reported that Oliver feels that by learning how development can help disadvantaged people worldwide, and combining this with his existing knowledge of agricultural science, he aspires to find ways to meet the food production challenges of a growing world population.

We couldn't be prouder than to think that our award played some part in this. Oliver travelled to Balibo in the western part of Timor Leste to learn, engage and contribute to a project addressing malnutrition and the standard of living in regional communities.

Currently people in the communities in and around Balibo walk several kilometres each day to reach reliable water sources, and this is usually done by children to the detriment of their time in school. The supply of water is a major limiting factor for the region in its pursuit of improving the standard of living. Through visiting and engaging with the local community and recently developed schools, a water supply plan was conceived that would not only improve access to clean potable water for more than 1000 people, but it would consequently allow the students to spend more time at school.



The success of this project is built around two major elements: it is locally led and supported to ensure it truly contributes to increased place-based capacity building for the local region and it targets impacts that compound to have greater impacts on the region. The latter is exemplified by the supply of water to schools allowing improved education opportunities for the youth. Improving the education of the young people is critical to the future of a country in which 60% of its population is under the age of 24. Importantly, this project can also be maintained into the future without ongoing international support.

“Experiencing the positive impacts that a strategic and locally constructive project is having has affirmed the contribution agricultural students can contribute to addressing global issues in a sustainable way,” said Oliver.

“Having this opportunity from receiving a Crawford Fund student award has allowed me to affirm my passion and interest in international and sustainable agriculture and is unique in giving undergraduate students the opportunity to learn in country and help fight the world’s fight,” he said.

Timor Leste gained independence in 2002 after suffering from decades of suppression. However, with the legacy of recovering from a devastating war, the country’s development with a population of 1.4 million has largely been focused around subsistence farming. Because of issues relating to quality and quantity of the food supply from the agricultural sector, over half the children under five suffer from chronic malnutrition and as a result suffer physical and often mental stunting.

“The project I was involved with sought to address issues in regional communities of Timor Leste by focusing on capacity building and following initiative and impetus from the local community. In particular, the project sought to address a critical issue of water supply directly into the community and schools by developing infrastructure to allow a pump system for water supply into the community and specifically, to five schools. The water quality is then addressed through the addition of Skyhydrant water purifiers.”

“Travelling to the township and community surrounding Balibo, I engaged in this project by visiting the current natural water springs, schools and community with both local community leaders and member of the project to help develop and design the system to allow both the supply and purification of the water.

“I saw and experienced first-hand the sustainable and long-term impacts agriculture development can have in equipping and importantly, empowering, a nation to achieve both an improved standard of living and level of independence at the same time.

“This project has already had tangible impacts by facilitating the improvement of existing structures to allow a temporary water supply whilst the community driven main water purification scheme to the schools is being developed. Together we can achieve great outcomes.

“This project and my experiences in Timor Leste have relied on the generous support from the Crawford Fund. The success and positive tangible impacts that are currently being seen in Balibo are a credit to the ongoing support of the Crawford Fund. The community of Balibo is inspiring in its efforts to change the course of their recent history and offer a positive and empowered future for the next generation. I thank the community and region for accepting and inspiring me.”

“Thank you to the Crawford Fund for providing undergraduates students opportunities and experiences in international agriculture. These experiences have an amazing impact on inspiring the next generation to contribute positively to the standard of living globally.

“Finally, my sincere thanks to Richard Warner and Chris Thompson for their ongoing inspiration, guidance and mentoring. Obrigadu (Thanks in Timorese/Portuguese),” he concluded.



ANNA MACKINTOSH, TAS - TIMOR-LESTE

## Improving maternal and child nutrition through agriculture

**Anna Mackintosh, University of Tasmania**

Anna Mackintosh, who is studying a Bachelor of Agricultural Science at the University of Tasmania, used her Crawford Fund Student Award to travel to Timor-Leste last year to work on a project targeting improved maternal and child nutrition through nutrition-sensitive agriculture, with support from the Kyeema Foundation. This is a summary of her experience.

Timor-Leste is one of the youngest countries in the world and has one of the highest global rates of malnutrition because food supply from the agricultural sector does not meet food and nutrition demands, and as a consequence, over half of all children under five suffer from chronic malnutrition and subsequent stunting. This issue is a direct result of the devastating war that occurred prior to independence in 2002.

During her time in Timor-Leste, Anna worked alongside the NSW Crawford Fund Committee's Dr Robyn Alders, who is also Chair of the Kyeema Foundation, and representatives from the Ministry of Agriculture and Fisheries (MAF) in Dili to design a masterclass to address this systemic issue.

"The masterclass brought together representatives from the MAF, the Ministry of Health, the National University of Timor-Leste, the Food and Agriculture Organisation of the United Nations, and local and international non-governmental organisations. This was a wonderful opportunity to work in a multidisciplinary team and collaborate with experts in such a wide range of fields."

Anna discusses effective control of Newcastle disease in poultry through routine vaccination and effective infectious disease control with girls and women in Viqueque.

With eighty per cent of the population of Timor-Leste being subsistence farmers, the population is highly dependent on annual crop yields to feed their families. However, cropping is not always feasible in some ecosystems, so the role of livestock becomes even more important as the primary food source. Livestock production however has its own challenges.

In Timor-Leste, poultry has been threatened by the virulent Newcastle Disease, an acute respiratory infection. The dedication of local and international veterinarians to combatting Newcastle Disease in Timor-Leste is crucial as this disease is not only threatening food security in regions where cropping is not appropriate, but also the overall improvement in nutrition of the Timorese people. Dr Alders is involved in on-going work in this area.

Anna and the other project participants travelled to the city of Viqueque to discuss ways to combat the transmission of Newcastle Disease in village chickens with farmers.

According to Anna, one special thing about village poultry is that they are often the only livestock that women have some say over. It is estimated that women could increase the yields on their farm by 20-30 per cent if they had the same access to resources as men.

"Learning the potential that agriculture offers to improve the standard of living in developing countries was an incredible opportunity and speaking directly with farmers was an invaluable experience that allowed me to understand the major challenges they face," she said.

"I thoroughly enjoyed my experience learning and engaging in international agricultural development and capacity building and am extremely grateful to the Crawford Fund for their generous support," said Anna.

"I learnt through working with Robyn and the Timorese community that international development is more about mentoring and offering support to scientists and farmers rather than being the 'hero'. Equally, the success of working in-country is highly dependent on the level of trust that is formed between you and the local community," said Anna.

"As a young agricultural scientist, this experience developed my skills working in-country and confirmed my interests in this sector. My eyes were opened to international agriculture during my first year at university and it was through the sense of social justice that my interests grew strongly. I decided that I had been very fortunate to have such a great education and that I should share it with others. However, it wasn't until I received support from the Crawford Fund to travel and work in-country that I could confirm my interests in this area," she said.

"I am extremely grateful to both Robyn Alders and the Crawford Fund for their generous support, which provided funds to travel in-country, conduct this important research and develop my skills working in international development," Anna concluded.

## **VICTORIA**

### Are Bankhar dogs a reservoir (or sentinel) host for canine vector borne diseases in Mongolia?

**Cassandra Davitt, University of Melbourne**

As part of her Bachelor of Veterinary Sciences PhD research, Cassandra Davitt from the University of Melbourne travelled to Mongolia in 2019, with support in-country from the Mongolian University of Life Sciences, to answer the question: are Bankhar dogs a reservoir host for vector borne disease in Mongolia?"

"The Crawford Fund gave me the opportunity to travel to Central and South West Mongolia to investigate the role of Bankhar dogs, traditional steppe dogs used by the nomadic herders, as a reservoir host for human vector borne diseases," said Cassandra.



Vector borne diseases (VBD) are illnesses that result from pathogens (viruses, bacteria or parasites) that can be transmitted to humans via the bite of an infected arthropod vector. Examples of such vectors include ticks, mites, fleas, sandflies or mosquitoes and it is well recognised that globally these ectoparasites feed on dogs, which in turn help spread VBDs that impact both human and canine health. Commonly known VBDs include Lyme disease, tick-borne encephalitis and anaplasmosis.

"To-date, there is no published literature on vector borne diseases in dogs in either Bayankhongor or Terelj, the areas in Mongolia I focused my research on, however, local veterinarians advised there is a tick problem in these areas," said Cassandra.

Herders are nomadic and move four times per year every year to find both pasture and shelter out of the elements suitable for livestock. The native Bankhar dogs are used as livestock protection dogs and they aid in reducing the stocking density of livestock and hence contribute to sustainable herding practices. Bankhar dogs are very clever, beautiful, talented and as they are working livestock protection dogs, they can be very aggressive.

"As we know there are VBDs in people, rodents, livestock and ticks in Mongolia, and we wanted to know whether Bankhar dogs are a reservoir host for human vector borne disease, ideally to implement preventative programs/recommendations to reduce ectoparasite burden and to educate both veterinarians and herders in prevention of disease," said Cassandra.

"Herders are challenging to locate as they are dispersed between valleys and there is significant distance (up to 30 mins drive) between gers (Mongolian traditional housing). During the Bayankhongor trip we sampled 35 nomadic herder Bankhar dogs, and in Terelj, an additional 18 nomadic Bankhar dogs were sampled. Unfortunately, due to the extreme temperatures (1 to 3 degrees celcius) in Terelj on the days we sampled less herders were available to participate," said Cassandra.

As well as a driver, local and district veterinarians were employed to aid humane restraint, sampling and data collection, and an ectoparasite control was applied to all participants. Blood was collected and frozen for export to University of Melbourne for next generation sequencing metabarcoding, and additional samples were collected (conjunctival swabs, serum, peripheral ear pricks, blood smears, ectoparasites) and will be included in Cassandra's PhD project with analysis to be conducted at a later date.

Next generation sequencing was undertaken for a number of VBDs. Of the 53 dogs sampled, 38 dogs tested positive for *Candidatus mycoplasma haematoparvum*; 34 tested positive for *Mycoplasma* (highly likely *M. haemocanis*); one tested positive for *Ehrlichia* spp. (which may be a novel species); and two tested positive for *Brucella* spp. (although not a VBD is most likely zoonotic *B. canis* which still has implications for public health). All dogs were negative for *Borrelia* spp., *Bartonella* spp., *Anaplasma* spp., *Babesia* spp., and spotted fever group *Rickettsias*.

A number of ticks and fleas were also collected for morphological identification as part of the PhD as there has been no literature published on the species of ticks found on dogs in Mongolia.

"This trip was both highly enjoyable and very rewarding. Although the sample size was small, there appears to be a very high prevalence of *Mycoplasma haemocanis* and *Candidatus mycoplasma haematoparvum*. It is currently unknown if these pathogens are tick or flea borne in this population and further investigation is required. Further to this, the potential discovery of a novel *Ehrlichia* species is extremely exciting," said Cassandra.

Further next generation sequencing metabarcoding is to be completed later this year on these dogs to determine the presence of protozoa, as well as deep sequencing to identify the *Ehrlichia* spp.

"Our preliminary results suggest that Bankhar dogs are a reservoir host for vector bone diseases in Mongolia and further investigation is warranted," said Cassandra.

"I would like to personally thank the Crawford Fund for their contribution to our research. Without their funding these beautiful dogs would not have been sampled nor had any next generation sequencing work undertaken and given these results. We will be doing further testing to investigate further and advise the local veterinarians of these dogs of preventative measures and treatment options available to them (if available in Mongolia)," concluded Cassandra.



CASSANDRA DAVITT, VIC - MONGOLIA



## Improving livestock production through research for development in the Central Dry Zone of Myanmar

**Peter Richardson, University of Melbourne**

University of Melbourne veterinary medicine student Peter Richardson undertook work in an ACIAR-funded project “Improving Farmer Livelihoods by Developing Market Orientated Small Ruminant Production Systems in Myanmar” in October. This is part of a collaborative project between The University of Melbourne and the Myanmar Livestock Department of the University of Veterinary Science and Yezin Agricultural University.

“The project works alongside participatory villages to assess ruminant health, test improved goat and sheep feeding strategies, animal health management and novel husbandry systems with the goal of increasing on-farm productivity in a realistic and sustainable manner,” explained Peter.

“I have taken away more than simply the physical experience of working in remote regions of a developing country but have been strongly influenced by the kindness and generosity of people who struggle daily to simply feed their family. It truly was an eye-opening experience,” said Peter.

This project was conducted as a pilot study for a large-scale study into livestock health, feeding practices and production systems in the Central Dry Zone of Myanmar. Villages were visited where data on animal health and production systems was collected, semi-structured interviews conducted to gain an understanding of village structure, economics and the role of women, and blood samples from animals were collected to provide insight into nutrition and parasitic disease.

“While results are still pending, it is apparent that animal nutrition is a key limiting factor with negative influences on animal growth, health and reproduction. This study provided a starting point for a large-scale research-for-development project involving the University of Melbourne and the University of Veterinary Science in Myanmar,” he said.

Understanding the value of small ruminants to the producer is vital in developing management plans to increase productivity. Inadequate nutrition was clearly identified as a key limiting factor in livestock operations.

“The data gained from this pilot study will help in selecting villages and townships for participation into the long-scale study, with many of the true and perceived health issues of livestock now clearly identified.

“This study provided insight into the feeding practices of farmers in these regions and identification of innovative farmers who might be willing to participate in feeding trials as a component of the larger study, where there is a huge potential to improve livestock health and growth.

“We have been able to establish connections between Australian research, Burmese researchers, local veterinary officers, Community Animal Health Workers and villagers which may help bridge this gap.

“By showing a repeated presence in the villages, a good rapport with farmers and headmen can be established, greatly contributing to the likely success of the project.

“On a more personal level, I gained great insight into the importance of good communication in maintaining good relationships with clients. This is something that I was already aware of, but my experiences reinforced this. It also showed me how essential nutrition is to animal health and production. While I had learned of this throughout my studies, it was eye-opening to see how stark the differences in animal health, growth and reproduction were in Myanmar compared to those in Australia,” said Peter.

“The experiences that I had in Myanmar would not have been possible without the assistance of the Crawford Fund. A big thank you to the Nossal Institute at the University of Melbourne, The University of Veterinary Science in Myanmar, the Livestock Breeding and Veterinary Department in Myanmar and all of the villages in the Central Dry Zone that agreed to participate in this project,” he concluded.

## **WESTERN AUSTRALIA**

### The Potential of Insects as a Sustainable Feed Option for the Aquaculture, Pork and Poultry Sectors in Myanmar

**Daniel Waterhouse, Murdoch University**

As part of his Masters of Development Studies, Daniel Waterhouse from Murdoch University recently travelled to Myanmar, with support in-country from Spectrum Sustainable Development Knowledge Network, to investigate the potential of insects as a viable aquaculture feed source that could augment traditional aquafeed ingredients such as fishmeal.

“Internationally the interest in insects as an alternative to traditional aquaculture feed ingredients such as fishmeal (largely comprised of wild caught fish) and soybean meal has been significant and continues to grow as concerns around the sustainability and price of fishmeal increase,” said Daniel.

“Research and development into the potential of insects in the aquaculture sector has been increasing as has the commercial interest in further developing this sector. However, the viability of the sector is far from certain with commercialisation still not being achieved to any significant degree,” said Daniel.

Myanmar is the 9th biggest aquaculture producer in the world with an annual production of 1 million tonnes, but it still only contributes 21% of all the fish consumed in Myanmar compared to 80% in Thailand and 55% in Bangladesh. However, it is likely that Myanmar will follow in increasing the proportion of farmed fish consumed as seen in neighbouring countries with farmed fish expected to supply around half of all fish consumed in Myanmar's growing cities as wild catch production stagnates, and will likely start to fall, and aquaculture production continues to grow.

"The aquaculture sector in Myanmar is an important source of employment, particularly in rural areas, and provides an opportunity for rural populations to increase their incomes (including women who are paid much higher wages to work in aquaculture than cropping) and improve the productivity and profitability of their land," he said.

"This is not restricted to producers of farmed fish, but also through the provision of support services and inputs, including aquafeed production, specific expertise and technical services and transport and logistics services," he added.

Globally, the aquaculture sector faces numerous challenges, with the price, availability and quality of aquafeed often the biggest challenge facing the industry. The interest in insects as feed has been significant and appears to be increasing with many research and academic papers being released and increasing private sector investment in research and development. However, however despite this, the production of insects for aquafeed still struggles to compete commercially with other feed ingredients. Further research and development, and increases in scale, will be required to make it more commercially viable, and this is likely to occur over the next decade according to Daniel's research.

"There is a significant need, which also presents an opportunity, for alternatives to fishmeal in aquafeed ingredients. There are several potential replacements including single cell proteins, animal by-products, plant-based alternatives and insects," said Daniel.



DANIEL WATERHOUSE, WA - MYANMAR

## ABOUT OUR STUDENT AWARDS

The Crawford Fund employs a number of strategies as part of our efforts to build the next generation of Australian researchers with an interest in agricultural research and development, including our Student Awards, conference scholar program, volunteering for projects overseas, and through our work with Researchers in Agriculture for International Development (RAID).

These strategies are part of our overall campaign for greater recognition of the impact and benefit of international agricultural research and development to Australia and to developing countries.

Our Student Awards, launched in 2017, and supported by our State and Territory Committees, allow university students to visit developing countries and gain valuable experience and expertise overseas 'in the field'.

Find out more at: [www.crawfordfund.org/awards/crawford-fund-student-awards/](http://www.crawfordfund.org/awards/crawford-fund-student-awards/)