Science

Taking You Places

Pathways for a Dynamic Career in Australia’s Primary Industries

Australian Government
Department of Agriculture, Fisheries and Forestry
IN 1991 I joined the School of Agricultural Science at the University of Tasmania to develop a program to improve science retention rates in the state’s north-west and encourage students to consider careers in primary industries. This program was the genesis of the Primary Industry Centre for Science Education (PICSE) – a national, integrated program that today comprises nine university-based activity centres.

As the national infrastructure for a supply chain providing the next generation of skilled professionals, PICSE inspires young people to study the sciences that support sustainable food and fibre production.

Our capacity to achieve future food security will be compromised without a stream of young Australians educated in the biosciences who can drive innovation and productivity growth.

The Australian Government, national agribusinesses, research organisations and universities continue to invest in PICSE because of its proven ability to generate a positive and sustained attitudinal change among science students that leads them to careers in primary industries.

Overseen by science education officers, the program has presented to more than 50,000 science students, coordinated camps and industry placements for almost 950 Year 11 and 12 students, and conducted professional development programs for about 1200 secondary school teachers.

Several PICSE program participants, university undergraduates and young professionals who graduated from the program recently participated in a Youth Round Table in Canberra to discuss issues underlying the lack of young professionals who graduated from the program recently.

The Government and industry recognise that today’s young people are tomorrow’s leaders, and we are committed to addressing these trends to ensure a future supply of highly skilled researchers, scientists and professionals that can meet our obligations.

This year we increased the number of student places in agriculture courses and allocated the highest rate of government funding for higher education.

We support PICSE as indicative of the Government’s commitment to build ties between schools and industry, and to expose students directly to the primary industries.

We also continue to build our research and development capabilities through the order of $700 million annually through Research and Development Corporations, Cooperative Research Centres, CSIRO and universities. These efforts are helping PICSE build productive, collaborative markets and to develop industry infrastructure.

Kevin Dobos
National Strategic Development Manager
PICSE

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The Australian Department of Agriculture, Fisheries and Forestry develops and implements policies and programs to ensure Australia’s agricultural, fisheries, food and forestry industries remain competitive, profitable and sustainable.

AgriFood Skills Australia is one of the eleven not-for-profit Industry Skills Councils established by the Australian Department of Industry, Innovation, Science Research and Tertiary Education.

Led by industry and funded by Government, AgriFood develops and implements workforce development strategies and industry’s nationally endorsed qualifications to meet current and emerging needs of agrifood enterprises, employees and students throughout urban and regional Australia.

A figure illustrating Australia's role in global food security.
the industry that is shaping our future

AUSTRALIA IS A global leader in agricultural science. Our primary industries produce almost 93 per cent of Australia’s fresh food supply¹ and feed almost 40 million people around the world². Export revenue exceeds $30 billion annually³ and the overall agricultural value chain represents a $150 billion-plus component of the national economy.

But the sector’s substantial contribution and the sophisticated technological innovation underpinning it receive minimal external recognition – a modern day ‘blind spot’ that has kept prospective students uninformed of the industry’s broad range of dynamic and rewarding career options.

THE TALENT HUNT IS ON

Australia’s agricultural workforce is ageing and demand for innovation is stretching the capacity of the science and research community. Universities are producing about 700 agriculture graduates each year for a job market exceeding 4000 positions⁴.

Yet food, fibre and biofuel production – industries essential to us all – are on the edge of unprecedented local and global challenges as they shoulder the burden of keeping our country, and indeed our planet, sustainable at a time of extraordinary challenges as they shoulder the burden of keeping our country, and indeed our planet, sustainable at a time of extraordinary challenges as they shoulder the burden of keeping our country, and indeed our planet, sustainable at a time of extraordinary challenges as they shoulder the burden of keeping our country, and indeed our planet, sustainable at a time of extraordinary challenges as they shoulder the burden of keeping our country, and indeed our planet, sustainable at a time of extraordinary challenges as they shoulder the burden of keeping our country, and indeed our planet, sustainable at a time of extraordinary challenges as they shoulder the burden of keeping our country, and indeed our planet, sustainable at a time of extraordinary challenges as they shoulder the burden of keeping our country, and indeed our planet, sustainable at a time of extraordinary challenges as they shoulder the burden of keeping our country, and indeed our planet, sustainable at a time of extraordinary challenges. They must have a sound grasp of plant and animal genetics, agronomy, biosecurity, soil biology and other biomaterials and renewable fuels.

These challenges will see demand for highly skilled professionals continue to grow, and enabled agriculture in the past, many of these technical positions will be based in cities.

IN CHALLENGES LIE OPPORTUNITIES

Exciting opportunities await graduates at all levels of the primary industries supply chain, from the laboratory to the farm, to engineering innovation, information technology, economics, global trade and marketing, and the full suite of biological and environmental sciences.

Agriculture has become technically very complex. Many modern farmers are tertiary qualified. To survive in the 21st century, farmers must be proficient in the use of satellite-guided precision agriculture and remote sensing. They must have a sound grasp of new fields such as aquaculture – fish farming – as a way of reducing the pressure that global food demand is placing on wild fish stocks.

Modern developments such as these can only be advanced by a skilled, motivated and professional workforce committed to turning challenges into opportunities – a workforce committed to being the difference between a stable and an unstable world.

PUSHING THE FRONTIERS OF SCIENCE AND TECHNOLOGY

Increasing climate variability is creating impetus in Australia for a low-emissions economy that will generate opportunities to develop bio-based products reliant on plant or animal materials for their main ingredients. These are likely to emerge through transformational research based on radical new ideas that push the frontiers of science and technology, leading to new concepts or fields of inquiry.

Biotechnology and other enabling technologies are expected to create openings for secondary rural production systems as new fuels, materials and other industrial feedstocks that currently depend on fossil fuels.

These scientific advances highlight some of the new vocational pathways available to young Australians, many of whom will be trained to apply their expertise across disciplines, providing even greater scope and flexibility.

SECURE THE FUTURE

Australia’s primary industries must continue to innovate to create a vibrant, sustainable agricultural sector that can be a positive influence on the future.

Within this challenge lie outstanding opportunities for the next generation to forge careers that are demanding, exciting, rewarding, global – and essential.

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This Conceptual Pathway Diagram depicts some of the major higher education and vocational training pathways to careers in Australia’s primary industries.


For further information about science courses consult individual university websites.
Agriculture is a knowledge-intensive industry that integrates science, environmental science, economics and social studies to manage systems for sustainable food and fibre production.

From broadacre cropping and livestock production to horticulture and viticulture, Australian agriculture produces 91 per cent of the country’s fresh food supply and feeds almost 40 million others, contributing to rural export revenue exceeding $30 billion each year.

The industry’s long-term capacity to compete and succeed internationally will be determined by its ability to recognise changing consumer preferences and to adopt new technologies and practices while protecting the environment.

Educated in soil science, genetics, cropping and pasture systems, livestock production, economics and agribusiness, graduates of Agricultural Science and Rural Studies are qualified to address the complex factors that shape agricultural systems.

Expertise is in high demand. Career opportunities range from the laboratory to the field and include roles in farm management and research, government agencies, universities, consultancy and professional services, food industries and fertilizer companies.

Study scholarships provide a window to primary industries

ACHEIVING GOOD MARKS during her final year of school in Tamworth, New South Wales, earned Kirsty McCormack several scholarships that are paying her way through university and kickstarting a career in agriculture.

“A great teacher” in her Year 11 and 12 agriculture studies triggered an interest in primary industries, which led to participation in the 2010 PICSE program.

“After doing my work placement with an agronomist, I decided to opt for a career in agriculture because I realised there were such broad opportunities,” she says.

Kirsty is studying her first year of Rural Science at the University of New England (UNE) and is currently focused on a career in cotton agronomy. “But I’m not 100 per cent sure; I also love livestock and genetics,” she says.

Her long-term goals include a Diploma of Education to enable her to teach agriculture “down the track.”

“I’d love to be as enthusiastic as my teacher was to inspire other kids and make them aware of careers in agriculture,” she says.

Aimed with a Rural Industries Research and Development Corporation Horizon Scholarship, an Australian Wool Education Trust scholarship, a Royal Agricultural Society Foundation scholarship, and a UNE Country Scholarship for academic achievement, Kirsty says her fees and travel expenses are largely covered for the duration of her study.

“These areas weren’t always considered an option in agriculture, so the realisation is that there’s a strong link between natural resources and agriculture. I think that’s a growing area,” she says.

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Australian expertise is a world resource

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- Australian Centre for International Agricultural Research: www.aciar.gov.au
- University of Queensland: www.uq.edu.au

A career in Australia’s primary industries is a passport to travel the world and experience other cultures.

International industry placements, exchange programs and overseas aid are just a few of the opportunities awaiting graduates in disciplines serving the primary industries.

Working overseas provides global awareness and exposure to international expertise and developments that can be adapted to improve Australian practices.

Australian expertise is a world resource

DR DARRYL SAVAGE says applying his agricultural expertise to benefit developing countries is the most rewarding aspect of his career.

As a lecturer and researcher at the University of New England (UNE) in New South Wales, Darryl is investigating how beef cattle can contribute to food security in Asia as a part of a project funded by the Australian Centre for International Agricultural Research.

“We aim to alleviate poverty in Cambodia by increasing beef productivity, improving biosecurity and identifying new markets for red meat in Vietnam and southern China,” Darryl says.

The project, which commenced in 2007, is driving significant change in the formerly war-ravaged nation. Along with growing demand for cattle production, the introduction of new cattle breeding practices has reduced the need for meat from smallholder farms, increasing school attendance.

“One of the Cambodian farmers’ highest priorities is education for their children, so technology adoption was a no-brainer,” Darryl says.

The project team has also partnered with Cambodian universities and trains undergraduate students in research skills, which is inspiring many to undertake further studies in Australia.

The legacy of this project is much greater than the project itself, it is creating life-changing opportunities with long-term gains and sustainable outcomes,” Darryl says.

“Hong Kong is a place where I’ve travelled through a couple of times and I really like it. I’m really looking forward to some of the specific subjects, like genetics and micro-biology,” Dr Darryl Savage

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DOMINIQUE COTTRELL has not yet started her Bachelor of Agricultural Science degree, but the industry has already taken her to other sides of the world, where she is working as a technical assistant in the French city of Toulouse with the agriscience company Anadiag.

“I help with chemical applications and assessments on post-harvest disease and pest resistance at the moment... I just love the work. It’s all about the moment in time,” she says.

A native of Devonport, Tasmania, Dominique is undertaking a gap year before commencing her degree at the University of Tasmania. She decided on her career path during the summer break between Year 11 and Year 12 after participating in the PICSE camp, site visits and industry placements.

“The first-year University of Western Australia agricultural science student refers to her one-week industry placement at Dow AgroSciences’ world renowned Waireka Global Discovery Research Station on New Zealand’s North Island.

Through the PICSE program she also spent a week at the Department of Agriculture and Food, Western Australia, working with staff in the livestock division.

Brydie sees an expanding role for Australian agriculture in feeding the growing world population, but is not sure where the degree will take her yet. She is leaning towards research into the production of more environmentally-friendly chemicals that have less effect on the land and soil quality. “There is a lot more focus today on the environmental impacts of farming practices, and making sure that they’re sustainable,” she says.

Brydie says there are many opportunities for work placements to gain experience in agriculture, and thousands of jobs in primary industries, both in Australia and overseas.

“My TIME IN New Zealand was the most amazing experience; it really opened my eyes to the travel prospects within the industry,” says PICSE Ambassador Brydie Creagh.

The first-year University of Western Australia agricultural science student refers to her one-week industry placement at Dow AgroSciences’ world renowned Waikere Global Discovery Research Station on New Zealand’s North Island.

Selected from more than 100 Australian secondary school students, Brydie worked alongside international researchers investigating the next generation of plant protection chemicals for growers of vegetables, fruit and cereal. "We spent time assessing chemical usage, mainly on basil," she says. "It was so interesting."

Brydie says the travel scholarship helped her to finetune her specific areas of interest in agricultural science before she commenced her degree. "Agriculture’s not just about farming. You can work in science and finance, and other areas, and still be working in agriculture," Brydie says.

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LEARN MORE
- University of Western Australia: www.student.uwa.edu.au
- Department of Food and Agriculture, Western Australia: www.agric.wa.gov.au
- Dow AgroScience: www.dawagro.com.au

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Agronomy applies aspects of soil and plant sciences to broaden crop and pasture management. It is fundamental to productive, sustainable agricultural and livestock production for the food and fibre industries.

Agronomy includes crop breeding; crop and pasture establishment; plant nutrition; weed, insect and disease management; and farm design. It is also linked closely to soil chemistry, physics, biology and water use. Faced with challenges including climate change, pesticide resistance and limited water supply, together with rising fertiliser and fuel costs, farmers are more reliant on advice from agronomists than ever before.

Global food production has tripled over the past 50 years, largely as a result of advances in agronomy.

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Science on the farm, a boyhood dream

AGRONOMIST JOSH CABLES is living his boyhood dream and following his father’s footsteps into the Tasmanian poppy industry.

After participating in the 2006 PICSE program, Josh went on to complete a Bachelor of Agricultural Science at the University of Tasmania before pursuing a career in agronomy.

He worked as an agronomist with Serve-Ag, providing advice on crops ranging from vegetables and cereals to seed crops, before accepting a position with Tasmanian Alkaloids.

“My father grows poppies and I have always been interested in moving into the area,” Josh says. “Tasmania provides the ideal conditions to grow poppies for the pharmaceuticals industry because of its isolation and climate. The low population helps to ensure safety, but research and development carried out by Tasmanian Alkaloids is largely responsible for breeding new ‘untouchable’ varieties to prevent misuse in the wrong hands.”

Josh says the PICSE program reaffirmed what he wanted to do. “It’s hard to see what the industry is about when you’re young and PICSE opened my eyes to what was available,” he says.

“I participated in a five day PICSE camp in Western Australia which broadened my outlook beyond Tasmania.”

The 24-year-old describes the steep learning curve as the most challenging aspect of his job. “You want to know everything at once – and it’s important to get a good mix of new ideas from your degree and practical experience to develop well-rounded knowledge. “He rates job variety and the “great farmers who are very supportive of the new generation” among the highlights.

“I am keen to stay with poppies for the foreseeable future and to make a difference in the industry,” Josh says.

I would also like to explore opportunities to grow poppies on my own property eventually. Poppies can pay quite well if you can increase yields and produce sustainably – a tricky balance to achieve.”

Josh is adamant that farmers have to add value to remain viable today. “New graduates need to realise that agribusiness and management knowledge are more important now,” he says.

“The new opportunities in primary industries are endless. Every mouth needs feeding, and there will be greater reliance on industries such as fibre and pharmaceuticals with the ageing population.”

“Secondary students need to get out there and get exposure to different ideas.”

A career to be proud of

ELIZA STAR GREW up on a mixed-enterprise farm near the town of Carahool, in the New South Wales Riverina. But she did not really consider the broad opportunities of agriculture until she undertook Year 10 work experience with an agronomist at the NSW Department of Primary Industries.

“The main thing stopping me going into the ag industry was that I didn’t really think there were any women,” says Eliza, a first-year Bachelor of Agricultural Science student at Charles Sturt University in Wagga Wagga, NSW.

“But the female agronomist I worked with was very highly regarded in the area, so I guess she was the role model who helped me get a new perspective on the industry.”

Eliza enjoys the challenge of a course with strong scientific foundations and a range of subject areas. “We’re doing animal studies and plants and soil. So it shows just how broad the industry is.” For the moment, Eliza hopes to pursue agronomy after graduation.

She is part of the Horizon Scholarship program, an initiative of the Rural Industries Research and Development Corporation (RIRDC) that supports the development of bright students in agriculture and related courses.

Sponsored by the RIRDC rice program and the Ricegrowers’ Association of Australia (RGA), Eliza receives an annual $5000 bursary and participates in development events with other young agricultural enthusiasts. At a recent Horizon Scholarship conference, the group discussed industry issues, how to strengthen their leadership and “went on the ABC’s Country Hour to build up our profile and public-speaking ability” Eliza also attended the 2012 PICSE Youth Round Table in Canberra.

When in need of advice, Eliza has a list of mentors she can call on, including two from the RGA. “They’ll email me questions about what I find interesting and keep me going, keep me on my toes so I don’t just slacken off. They act as role models.”

“Secondary school students that want to get into agriculture, I’d say it’s definitely not the whole akubra thing and sitting on a tractor all day. It’s an industry that you can be proud of.”

LEARN MORE

University of Tasmania
www.futurestudents.usq.edu.au

Serve-ag
www.serve-ag.com.au

Tasmanian Alkaloids
www.tru.com

Charles Sturt University
www.csu.edu.au/courses

Horizon Scholarship program

Ricegrowers’ Association of Australia
www.rga.org.au

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Tasmanian Alkaloids
Lachlan’s quest to make a difference

“THERE ARE OPPORTUNITIES to change lives through agricultural science; agriculture will be the next boom industry – mining won’t last forever.”

His confident stand on contemporary agricultural issues belies the fact that Lachlan Hunter is only in Year 12. But the boarder at the Western Australia College of Agricultural in Cunderdin already has a clear picture of his future in agriculture. He attributes this to his upbringing on a mixed-farming property at Bruce Rock, a strong grounding in theoretical and practical knowledge acquired at secondary college and his participation in the PICSE program.

“The WA College of Agriculture is an independent school on a farm that enables you to select trade, farming practice or agribusiness streams, as well as core subjects including English and mathematics,” Lachlan says. “The WA College is one of few that offers the Australian Tertiary Admissions Rank program.”

Lachlan has always wanted to study agriculture, but he says the PICSE program helped him to narrow his career goals to focus on plant production.

“Next year I hope to study Agricultural Science at the University of WA, followed by postgraduate study to become a plant breeder,” he says.

“I would like to breed new salt-tolerant cereal varieties for the WA environment, which is becoming drier, and I am keen to work for [Australian crop-breeding company] InterGrain, where I did my industry placement.

“I see the practical side of things on the farm so the opportunity to see what was happening in the laboratory at InterGrain helped me to marry the two,” Lachlan says. “InterGrain’s collaboration with international breeding companies Syngenta and Monsanto may present global work opportunities.”

As a PICSE Ambassador, he promotes primary industries in science education and is passionate about “reaching out to rural and remote kids to let them know about the opportunities offered by the PICSE program.”

LIFE EXPERIENCE GOES A LONG WAY

FORMER UNIVERSITY OF Western Australia Vice-Chancellor Emeritus Professor Alan Robson is thrilled to be one of the first mentors appointed under the PICSE program because he believes in “learning from experience” – the experience of elders.

Now based in the university’s School of Earth and Environment, Alan mentors Year 12 student Lachlan Hunter and is guiding him to make the transition from agricultural secondary college to university.

“Agricultural secondary schools don’t do a lot of HSC subjects and Lachlan may not have quite enough chemistry,” Alan says. “I will help him to do bridging courses to ensure he will succeed at university. He is a very bright young man and his agricultural knowledge will put him well ahead of other students.”

Alan draws on a wide network and says he can refer Lachlan to others, both in the university and other spheres of agricultural science, “to help him make informed decisions”. “Agriculture is a high-tech sunrise industry and will become even more important in terms of food and fibre production, as the population increases and land resources diminish,” he says.

“I am passionate about ‘reaching out to rural and remote kids to let them know about the opportunities offered by the PICSE program’.”

SCIENCE – TAKING YOU PLACES

LEARN MORE

University of Western Australia
www.studyat.uwa.edu.au

InterGrain
www.intergrain.com

The Australian Science Teachers Association
http://asta.edu.au/
ALTHOUGH AANANDINI GANESALINGAM studied science in Year 11, she saw herself as an "arts student". She was planning a career in law or journalism – until she took part in the PICSE summer work placement program.

Aanandini spent a week at the University of Western Australia (UWA) working with plant breeding researchers – helping in the laboratory and "tagging" research students as part of the program. She admits the forensic science television drama CSI may have encouraged her to select science subjects in her senior years. But it was her work experience and the prospect of a career in primary industries that led her to a Bachelor of Agricultural Science degree at UWA.

"No-one in my family was involved in agriculture in any way and when I started at university I was the only 'city' person in my class. All the others were from farms or rural communities," Aanandini says. She completed her honours year in 2009 and is nearing the end of her PhD thesis on plant breeding. Aanandini says being involved in research provides a good mix of hands-on fieldwork and office or laboratory work.

A research career has also provided her with the opportunity to travel around Australia and internationally. She has visited both India and Thailand looking at plant breeding projects.

Aanandini says careers in primary industries are not as well promoted as other industries, such as mining, but she believes agriculture has a more long-term outlook than mining. Australia’s mineral resources boom will come to an end, but the need to produce food will continue, she says.

"We have a lot of land in Australia and with a growing global population there is a need to produce more food, more efficiently," Aanandini says. Her career goals are to continue in the plant breeding field, with a focus on developing new varieties that are better adapted to the challenges of a changing climate.

"The bigger focus on sustainability in the primary industries has created a greater need for environmental science graduates," Delia says.

In her role as a PICSE Ambassador, Delia provides a student’s perspective at conferences and recently attended a national forum in Canberra to help create “a greater focus on rebuilding the agricultural workforce”.

"The opportunities with PICSE continue long after the program," she says.
FISHERIES

Australia’s commercial fishing and aquaculture industry is valued at more than $2 billion annually, with production focusing on high-value export species such as lobsters, prawns, tuna, salmon and abalone.

The pursuit of new ways to feed more people has given rise to marine and freshwater aquaculture. Experts in marine biology, oceanography, geosciences and environmental management, marine scientists are caretakers who manage the human impact on marine environments and protect Australia’s marine reserves.

Career options are diverse and include marine environmental management, fisheries, conservation policy, tourism and recreation, marine biotechnology, biodiversity and marine ecology.

“I KNEW I wanted to pursue a career in science, but PICSE gave me a broader view; I didn’t realise how many technical jobs were available in primary industries,” researcher Gabby Bennett says.

Gabby grew up in South Australia’s Riverland surrounded by agricultural production, but she was always fascinated by marine biology.

After participating in the PICSE program in 2006, she completed a three-year Bachelor of Science in Marine Biology at Flinders University, then moved south to take up a position with Petuna Seafoods in Strahan, Tasmania.

Earlier this year, Gabby was appointed as a research officer with Hobart-based Australian Seafood Industries. The company produces selectively bred oysters, which are supplied as brood stock for Tasmanian commercial hatcheries.

“The market is looking for stock growth, condition, survival, uniformity and shell shape. The latter is very important in marketing,” Gabby says. “We are trying to produce these traits through research.”

Gabby relishes the variety her job provides.

“We do all the stock management and handling; ourselves so there are opportunities to get out on the water as well as working in the laboratory,” she says. “Discovering new things that are useful to the industry is very satisfying.”

Gabby is studying honours in Marine Science part-time off campus with the University of Newcastle. “It involves some juggling, but my studies complement the research we are doing at work so I can apply the knowledge,” she says. “We do all the stock management and handling; ourselves so there are opportunities to get out on the water as well as working in the laboratory.”

Gabby says she is trying to produce these traits through research.

“Our farmers are the most important people in our lives. They don’t just give us the food that we eat, but also the clothes that we wear – cotton, wool – it’s a huge and diverse industry,” Hollie says. “People from the city come into the tent not knowing much about the industry and leave with a better understanding and appreciation.”

“Technology is a big part of the industry. I don’t think people are aware of the high-class technology that is being adopted by our farmers. Labour is one of the greatest on-farm costs and with the added pressure of trying to compete in global markets, our farmers have to become the most efficient they can be. Advances in technology will help to realise this objective.”

This year Hollie participated in the PICSE Youth Round Table in Canberra. She is also an ambassador with AgriFood Skills Australia, an organisation for training and workforce development in the agrifood sector and regional Australia.

Hollie’s passion for the industry has led her to commence a Diploma of Education at Charles Sturt University, after which she hopes to become a secondary school agriculture teacher.

“The bit that I love is talking to students and perhaps inspiring them to look further than just the farm. Obviously the farm is the basis of the ag industry, but there’s so much more you can get involved in. I love that.”

Hitting the road to talk up agriculture

FOR HOLLIE BAILLIEU, chair of the Young Farmers’ Council of New South Wales Farmers, the best part of agriculture is the people.

“I’m a bit of a talker and the people you meet and associate with in the ag industry are the most incredible people you’ll ever meet,” says Hollie, who completed her Bachelor of Agricultural Science degree at Charles Sturt University in 2011.

This year Hollie has been driving around the country with the roadshow component of the Australian Year of the Farmer, an initiative celebrating Australian agriculture. The roadshow comprises a fleet of four-wheeler drives with attached trailers. Its custodians engage visitors through interactive displays and educated conversation.

With the roadshow, Hollie has visited public events including agricultural shows, careers fairs, cultural and sporting events. In urban areas, the task is to spread the message about what it means to be a farmer in a competitive international market.

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Forests occupy almost 20 per cent of Australia’s landmass. Hardwood – predominantly eucalypt – and softwood plantations cover about two million hectares and produce more than 18 million cubic metres of timber each year.

The forestry sector is one of Australia’s largest resource and manufacturing industries, and one of its most diverse. Plantation and farm forests are critical to regional economic development and provide environmental benefits such as carbon sequestration, estimated at 81 million tonnes per year.

Forestry professionals work from boardrooms to the bush, in conservation and production. Using their knowledge of trees and forest ecosystems, they work with people, companies and governments to address environmental and economic issues; manage native forests for conservation and sustainable production; manage forested landscapes for environmental services; and develop new forest industries to address land degradation, restore landscapes and help farmers to diversify their income.

Forestry research and development aims to improve the competitiveness and sustainability of the Australian forest and wood products industry through innovation.

Sowing the seeds for a career in forestry and horticulture

“We HAVE A growing population to feed and fewer land resources – issues that highlight the need for a skilled agricultural workforce to ensure we can do things more efficiently,” Tasmanian researcher Dr Kieren Rix says.

“For graduates of courses related to the primary industries, the world is their oyster; the opportunities are incredibly broad.”

For someone who didn’t know what he wanted to study at university and had never considered agriculture, Kieren has forged an impressive career path and created the PICSE program with exposing him to new opportunities in Australia's primary industries.

“PICSE showed me how science and agriculture could link together and I was confident agricultural science would appeal to me to get a job that was focused, one that could solve real-world problems in a real-world context,” he says.

In the decade since he completed the PICSE Program, Kieren has aligned himself with a thesis on Agronomic Science with honours from the University of Tasmania and completed a PhD investigating establishment issues in blue gum seed germination – a project that has national and international applications.

He undertook the research in conjunction with Australia-based industry partner seedPurity and now works for the company’s co-arm seedEnergy in Margate, Tasmania.

“Most of my work is focused on Brassica vegetables, among others, for the horticulture industry, with an emphasis on disease, increasing seed yields, and understanding pollination to increase productivity,” Kieren says.

“Some of the projects we work on will also reduce reliance on chemical sprays if we can control disease.”

His career aspiration is to work at a high level in research. He would like to undertake postdoctoral research and work in forestry again, but the industry has upped down in Tasmania, which creates challenges. He may have to pursue opportunities overseas.

At present Kieren is enjoying his work in horticulture. The 28-year-old says seedPurity has solved a lot of industry issues and is facing a significant change – “strengths that inspire me to keep working for them.”

He believes that consumers are demanding more sustainable products, but are also more price driven – “two things that don’t go hand in hand, which proves a challenge.”

“Farming is becoming more innovative, advanced and high-tech to cope with these demands and there are huge opportunities in research,” he says.

“It’s important to think outside the square. A degree in agricultural science opens up many opportunities irrespective of what you are going to be a farmer. My advice to students is to keep options open, study a broad range of subjects and do what inspires you.”

There’s plenty of variety in agribusiness

IF YOU CRAVE variety in your working life and enjoy meeting people, look no further than a career in agribusiness.

Rural officer Helene Gunn joined Rabobank’s agribusiness team as a fresh graduate in December 2011 and spends her day working closely with farmers and others in the primary industries to meet their financial needs. On any weekday she could be in the bank’s Launceston office, assessing farm loans, deposits and equipment finances, or out on the road visiting clients.

“I love talking to clients and seeing what they do,” Helene says. “I have learnt about a range of farm businesses in this role, from dairy and beef to sheep, cropping, horticulture and viticulture. Tasmania’s agriculture industry is so diverse.”

A work experience stint at a bank during her final year of a Bachelor of Agricultural Sciences with honours at the University of Tasmania confirmed her interest in agribusiness.

“I grew up on a farm in Westbury [northern Tasmania], which, along with the PICSE program, inspired my interest in the industry I love.”

When choosing a degree to pursue, Helene says agricultural science was the logical choice, it melds all of that,” Helene says.

“Agribusiness offers a combination of office work and farm visits, it offers the best of both worlds.”

Working for one of the world’s most recognised financial institutions – with branches in almost 50 countries – also provides a global perspective on agriculture.

“Rabobank has a strong research arm so we receive regular updates on what is happening around the world and how that shapes what is happening in Australian farming,” Helene says.

“We also travel for training, which provides an opportunity to meet people from other regions.”

Helene says her job has heightened her understanding of “how important finance is for farms to stay viable and sustainable.”

“Some of my clients are excellent farm managers with strong financial knowledge, but the risks associated with climate and fluctuations in commodity prices can prove challenging,” she says.

“Farming requires knowledge and skill. A lot of younger people coming onto farms have a tertiary education, which is good for the industry. You have to be very business-minded, and savvy with technology and research, to succeed against the odds.”

The 23-year-old is keen to further her career in agribusiness. “Rabobank encourages you to learn, grow and fulfil your ambitions,” she says.

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○ University of Tasmania www.futurestudents.utas.edu.au
○ seedPurity www.seedpurity.com
○ seedEnergy www.seedenergy.com

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○ University of Tasmania www.futurestudents.utas.edu.au

AGRIBUSINESS

Australia’s agribusiness value chain represents a $120 billion-plus slice of the national economy. In a world of increasing globalisation with threats to food and fibre security, graduates with high-level problem-solving and communication skills are in high demand to ensure agribusinesses remain competitive and sustainable.

Grounded in both agricultural knowledge and applied business skills, graduates draw on knowledge in farm business administration and planning, finance, economics, marketing, supply-chain management and more, to create better, more profitable outcomes.

Career paths include rural lending and investment, farm products merchandising, stockbroking, public accounting, small and medium-enterprise management and various roles within government.
Agriculture brims with professional diversity

Haydn Valle came from PICSE’s National Youth Round Table in Canberra in June 2012 impressed with the enthusiasm of participants for the future of primary industries in Australia. Haydn is a recent university graduate, now working in Canberra as an analyst with the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) as part of a four-year Bachelor of Resource Economics degree at the University of Sydney. He says primary industries have a need for people with a diverse range of skills and interests, not just in the sciences or farm agronomics. "You can find a fit for your expertise. Agriculture is a dynamic industry and it is constantly changing," say. "Even if you study an agricultural degree, it doesn’t necessarily mean you’ll be a farmer." Haydn says his own experiences changed his perception of the relationship between agriculture and the environment. When he started studying at university he saw agriculture and the environment as competing interests. But after spending time with Border Rivers-Gwydir Catchment Management Authority (CMA) in northern New South Wales, he saw the two sectors as fundamentally integrated and interdependent.

"Rural communities and farmers really are the ‘greenkeepers’, of sustainability,” Haydn says. "Australia is an international leader in plant science and trade, among other specialties, agricultural biosecurity to fisheries and forestry,” David says. "I definitely see my future in the primary industries now,” he says. "Rural communities and farmers really are the gatekeepers, or the ‘greenkeepers’, of sustainability,” Haydn says.

Great stories there for the telling

David Betros-Matthews had his sights set on a career in sports media when he completed a Bachelor of Communications at the University of Newcastle in 2010. But after taking a gap year to work and travel, he was drawn to the Australian Government’s graduate program and moved to the nation’s capital to take up a position with the Department of Agriculture, Fisheries and Forestry (DAFF).

"I was looking at graduate programs in a range of departments, but DAFF interested me the most because of the size of the portfolio and its breadth, which covers everything from biosecurity to fisheries and forestry,” David says. The 11-month program has proved a steep learning curve, incorporating a Graduate Certificate in Public Administration, three interdepartmental rotations, a stakeholder research project and leadership training.

"I definitely see my future in the primary industries now,” David says. "Australia has a huge responsibility in helping to achieve global food security and working on issues that are topical and important is extremely satisfying.

"Australia is an international leader in plant science and animal husbandry, and agriculture has become progressively more innovative over recent decades. But the industry wrestles with negative perceptions that do not reflect how dynamic it is as a whole. "I think agriculture’s image needs to be framed around feeding the exploding global population and effective communication has a crucial role to play."

David recently participated in the PICSE Youth Round Table in Canberra to seek innovative ways to better communicate Australia’s agricultural success and contribution to global food security, and to discuss the shift required to change public perceptions of agriculture. He says many students in disciplines ranging from communications to commerce do not appreciate the vast opportunities available in the primary industries. "I would encourage anyone to consider a career that supports agriculture, it can be very rewarding both personally and financially,” he says.

ABARES
Science and economics for decision-making

Science – taking you places

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○ Australian Bureau of Agricultural and Resource Economics and Sciences
  www.daff.gov.au/abares
○ University of Sydney
  www.sydney.edu.au/courses
○ Border Rivers-Gwydir Catchment Management Authority
  www.brg.cma.nsw.gov.au
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○ University of Newcastle
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○ Department of Agriculture, Fisheries and Forestry graduate program
  www.daff.gov.au/about/jobs/graduate/gdp

COMMUNICATIONS

Effective communication underpins stakeholder engagement, awareness, understanding and action. In Australia’s primary industries, communication is the bridge between research and improved adoption and management decisions.

Communication specialists establish mutual understanding between an organisation and its stakeholders by evaluating public attitudes, identifying an organisation’s policies and procedures with the public interest and developing tactical communications to meet the organisation’s objectives.

Professionals trained in media and communications forge careers in rural journalism, media relations, public and stakeholder relations, strategic communications, and issues management.
Meaningful research ‘the bees knees’

“THE UNIVERSITY OF Western Australia (UWA) offers me the necessary equipment and expertise to identify and defeat bee parasites, which are killing honeybee colonies worldwide,” says Professor Boris Baer, director of the Centre for Integrative Bee Research (CIBER) at UWA. “But we need a new generation of researchers on both the applied and pure sides of science, which will require graduates in science and agricultural science.”

Boris explains the importance of honeybee research during regular addresses to PICSE students. “There are serious implications for human food production and ecosystem stability. One third of what we eat wouldn’t exist without bee pollination, with an annual value of about $6 billion for Australian agriculture.”

For my PhD I researched dairy pasture agronomy, looking at different species options for farmers and how to manage them most effectively,” she says.

Another current ‘cross-boundary’ research project, funded by the UTAS Institute for Regional Development, is based around the general skill shortage in agriculture and how to encourage more young people to enter the industry. “There is great satisfaction working in a vital industry that feeds the world,” Lydia says. “Indirectly, sustainability is one of the key challenges facing the primary industries, but adds this does not stop at environmental sustainability. “It’s also about people and profit and remaining viable,” she says. “Consumers have to expect to pay a fair price for fresh, quality produce.”

Boris says that – among other things – plans to reintroduce killer’ it will spread rapidly.”

Life in a ‘bee-free’ world can be experienced in some regions of China, where the overuse of pesticides has killed all bees and trees are now being pollinated by hand, but human labour is not viable in western countries, Boris says. “The workers in a single bee colony can carry pollen up to 400,000 kilometres each day and to millions of individual flowers,” he says. “The potential loss of this service is scary, because in most parts of Australia there are no mass replacement pollinators available for food production.”

While it could take more than a decade for the bee to develop a natural tolerance to the varroa mite, Boris says science could accelerate this process. Boris completed his undergraduate and postgraduate science studies in Switzerland, then moved to Denmark to undertake postdoctoral work before accepting a post at UWA seven years ago. He now leads a team investigating honeybee reproduction, immunity and ecology that – among other things – plans to reintroduce generic material and tolerance mechanisms of WA feral bees to managed bee colonies.

By combining evolutionary biology with the molecular sciences, we can understand parasite recognition and bred bees that are better able to cope with the present and future challenges,” he says.

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Nuffield Australia is a non-profit organisation that coordinates the Nuffield Australia Farming Scholarship, which provides outstanding Australian producers with the opportunity to explore farming practices overseas. The scholarship promotes excellence in all aspects of agricultural production, distribution and management and aims to develop a network of globally aware farmers who can articulate and satisfy the needs of the agricultural industry and the community.

Nuffield Scholars return from overseas fact-finding missions better equipped to manage their operations for future growth. They become part of a global network that exposes them to international developments and opportunities.

The Australian Rural Leadership Foundation’s mission is to create compassionate leaders who can think strategically, negotiate skilfully and influence communities, industries and policy makers.

Its 59-day leadership initiative, the Australian Rural Leadership Program (ARLP), is conducted part-time over 17 months and has turned out more than 500 graduates from sectors ranging from grain production and agribusiness to rural health and tourism.

ARLP graduates are spread throughout all levels of government and industry at regional, state, national and international levels.

A world of opportunity

JULIE BRIEN’S HUNGER for knowledge has shaped a career pathway that has opened her eyes to agricultural practices across the globe.

After secondary school, Julie worked at remote sheep station “Boll Boinoke” – the birthplace of the Peppin Merino – before undertaking a Diploma of Applied Science at Longreach Pastoral Campus.

She went on to work as a jillaroo in the Riverina, then returned to the family’s sheep and cropping property at Greenethorpe in the central-west region of New South Wales.

While she was working, Julie commenced an 18-month certificate in Feedlot Management and Animal Nutrition, which was accredited towards a Bachelor of Agriculture at the University of New England (UNE). She completed the degree via distance education over six years.

“I started the certificate because I wanted to know more about feedlot management and it exposed me to a wealth of evidence-based information and put me in contact with other producers,” she says.

The 34-year-old’s network extended further after she successfully applied for a Nuffield Australia Farming Scholarship sponsored by Meat and Livestock Australia (MLA).

“Nuffield is a wonderful opportunity to get a global perspective of agriculture and to advance your understanding of what we do here, and how that plays out on the international stage,” Julie says.

Through the scholarship, Julie participated in the 2012 PICSE Youth Round Table and has forged a strong connection with MLA.

“I was involved in MLA pasture research and the BioGro project, which put me in touch with the latest research and development,” Julie says.

As a result she adopted electronic identification technology, which enables her to conduct better performance recording to inform targeted culling and improve lambing rates.

“Agriculture continues to become more research and science-based, and farmers rely more on others for information to make decisions with greater accuracy,” she says.

If students understand how food and fibre are produced, they will realise there are many career opportunities all along the supply chain from science and research to information technology, communications systems, agribusiness, value-adding and marketing,” she says.

“It is important to keep an open mind.”

Education doesn’t stop at university

“EDUCATION DOESN’T STOP at university,” according to South Australian grain grower Robin Scharfe.

The fifth generation farmer and dux of his Diploma of Farm Management class at the University of Adelaide’s Roseworthy Campus where he studied several years ago, received a Nuffield Australia Farming Scholarship that is providing a unique mid-career opportunity to further his education. Scharfe said his Nuffield scholarship was a unique chance to develop skills in international agriculture. The Nuffield exposes you to international agricultural systems, he said. “It opens your mind to where agriculture is at around the world and provides an opportunity to take advantage of an amazing network of scholars, experience and knowledge.”

The 2012 scholar is studying farm business management systems and medium to long-term weather forecasting overseas, with a focus on decision-making tools.

Sponsored by the Grains Research and Development Corporation, he recently visited the European Centre for Medium-Range Weather Forecasts (ECMWF) in England – the world’s premier forecasting site. “A lot of Australian systems are based on ECMWF’s data and the visit gave me an appreciation for how much weather forecasting has improved,” he says.

“Seven-day forecasts are just as reliable as one to two-day forecasts were 10 years ago, and long-term [seasonal] forecasting has also improved.”

As managing director of Bulla Burra Operations, an 8000-hectare collaborative farming venture in Loxton, SA, Robyn relies on this information to guide the operation’s low-rainfall dryland cropping program, which comprises wheat, canola, barley and mustard, as well as lupins and lentils.

“Having good systems in place can streamline the practical and business management of a farm,” he says. “Probability is never 100 per cent – there is an element of chance so it’s about using the information to make adjustments and manage risks.”

Robin’s Nuffield study tour includes visits to Argentina, the US, Canada and Europe, before he returns to England to explore other agricultural developments.

Bulla Burra Operations is a keen supporter of the PICSE program and regularly hosts student and teacher visits to demonstrate innovations in agriculture. “We use cutting edge technology here and it blows their minds,” Robyn says.

Careers in agriculture ‘a real eye-opener’

ALANA JOHNSON SET her course for a career in agriculture while she was still in Year 10 at Calrossy Anglican School in Tamworth, New South Wales. This year she is completing Year 12 and intends to begin a Bachelor of Agricultural Science in 2013. Alana first considered agriculture because of the job opportunities and was encouraged by her family and teachers.

She organised two weeks of work experience with Landmark and fell in love with cropping and crop science. She has not changed her career focus since, although she now realises that careers in agriculture are far broader than just this year level.

In 2010 and again in 2012 Alana attended the National Cotton Conference as part of her school agriculture class. She also did laboratory work and data entry, and learned about the Cotton Growers Services, Gundagai, NSW. “It was a real eye-opener to see how much is involved in managing cotton after picking to meet the company’s requirements – how careful you have to be with genetically modified organisms (GMOs),” she says.

Her agriculture teacher also encouraged her to apply for the PICSE work placement scholarship and she spent a week with the Australian Cotton Research Institute in Narrabri, NSW. She helped researchers collect field data, did laboratory work and data entry, and learned about the various PhD research projects.

This year Alana attended the PICSE National Youth Round Table as the University of New England’s representative, and has been awarded a Dow AgroSciences Travelling Scholarship Award for a work placement in New Zealand at the Wairakei Field Station. “At the Round Table we put forward our ideas to the industry leaders, and they think they heard some views that they hadn’t considered before,” she says.

“Our motto from the Round Table was that ‘every farmer is a hero’. They’re feeding Australia, they play a massive role in keeping the country running. But agriculture is not just sitting on a tractor.”

“It’s a very diverse field and you can switch between different sectors if you have the basic scientific grounding. There are amazing job opportunities in everything from scientific research, to finance and agronomy.”
AGRICULTURE MUST INSPIRE OUR TEACHERS

A LONG-TERM APPROACH to school education and career attraction is necessary to reverse the declining skills base in Australia’s primary industries and its potential impact on our food security and innovation.

Australia’s capacity to feed 70 million people here and abroad is dependent on improving knowledge and understanding of food and fibre production among school-age children.

We must focus on a greater exposure to the primary industries at all levels of schooling: primary, secondary and tertiary.

The Health of Australian Science report by the Chief Scientist of Australia, Professor Ian Chubb, confirmed that senior school participation in science had declined, and cited agriculture, chemistry, mathematics and physics among the undergraduate disciplines with dwindling numbers.1

Professor Chubb’s report recommended encouraging greater student involvement in science to improve uptake at school and identified teachers as an important source of inspiration.

Agriculture is not widely seen as the modern, cutting-edge industry that it is, and teachers who quote increasing numbers of examples from agriculture and the biosciences are key to changing this attitude.

To this end, industry outreach is important and the PICSE program – which provides resources for both secondary school students and teachers – is a valuable way to take information about the primary industries into the classroom.

We also need to explore other ways to support the school curriculum and to embed agricultural sciences in a school’s program, because agriculture should not be treated as a shut-away component of society. It has made a significant contribution to the economic, social and cultural fabric of our lives since the moment we became hunter-gatherers.

Responding to evolving human preferences and needs, supporting population health and addressing global challenges will require sustainable agricultural and fisheries practices. These practices will extend beyond the conversion of solar energy into food, fibre and fuel to include other renewable energy sources such as wind, hydro and geothermal sources; and consideration of ethical and social issues, including food miles and genetic modification.

These developments will present a range of career opportunities for the next generation, many of them beyond the farm-gate, in exciting new fields such as biotechnology and nanotechnology, as well as in support services including agricultural economics, marketing and communications.

PICSE is a wonderful portal to the diversity of rewarding career options in the primary industries – careers that will enable young Australians to flourish as they tackle the most important issues facing mankind.

Professor Lyn Beazley AO FSTE
(Chief Scientist of Western Australia)
Chair, PICSE

1 Office of the Chief Scientist 2012, Health of Australian Science, Australian Government, Canberra

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