

TOMORROW/S AGRICULTURAL SCIENTISTS – MEETING INDUSTRY AND RESOURCE MANAGEMENT NEEDS

A Summary of Presentations

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Summary

More than 100 people from all sectors of agriculture attended a Conference/Workshop on Education for Agriculture, convened by the SA Division of the Australian Institute of Agricultural Science in Adelaide in March 2007, with the funding support of GRDC.

The attendees not only enjoyed a range of informative addresses on the subject, but then took part in groups discussions which defined the key issues and how, and by whom they should be addressed. The AIAST will take the lead in this process which is critical to the future of the profession and agriculture as a whole.

The keynote perspective

Professor Alan Robson, Vice-Chancellor of the University of Western Australia, opened by highlighting the changes that had been occurring in agriculture – changes in the age demographic, the reduced percentage contribution of agriculture to the GDP, and the perceptions of the social impact of drought, rural downturns, hardship and the fact that agriculture is not recognised as a “high-tech” industry by the urban community. None-the-less, the impact of drought on the nation’s agriculture and its flow-on to the entire economy had been clearly evident. The vast majority of Australians only hear of agriculture when they learn of some “catastrophe”, yet great progress has been made in Australian agriculture.

Today, integration skills with better teaching of disciplines and additional mathematical skills are more important than training in physical techniques of “doing”. Universities face the fact that funding per student has been reduced by one-third, there is an increasing aspiration for students in the Go8 universities to do double degrees, agriculture teaching is expensive (its students pay 28% of the cost compared to 83% for Law students) and agricultural enrolments have been progressively declined. Six hundred Full Time Student Equivalents (FTSU) seems the minimum for course viability and only five Australian universities have that in agricultural courses.

A pre-requisite is to address the image of agriculture in schools, an approach already being undertaken jointly by UWA, the University of Tasmania and the WA Department of Agriculture and Food. Perhaps the traditional agricultural colleges should have been maintained. Managing agriculture is equivalent to managing natural resource systems. The recommendations of the 1990 McColl Committee are still pertinent today. There is a need for a national coordination body for agricultural education, with consolidation into a limited number of providers – perhaps one in each state or even moving to the three-region model adopted by the Grains R&D Corporation. There could be rationalisation without much pain, perhaps with some assistance for structural adjustment. The problem remains that universities are established by the states and funded by the Commonwealth.

Innovative approaches should be sought for teaching agriculture, encompassing “paddock to plate”. Each University, cannot and should not be expected to be able to have staff to teach all areas. UWA even imports expertise from UK to teach subjects in short, pressure cooker format.

Agribusiness and the new Graduate

Andy Thomas, Commercial Operations Manager, Seeds, for Nufarm reminded the Conference that agribusiness employed agricultural graduates to get economic business out of them. However, there is no single “agribusiness”, and different post-graduation “grooming” is needed for different roles. A breadth of understanding is sought in the new human capital taken on as graduates. They generally come with good science, capacities to self teach and are “self-starters”, they have good IT and software skills and are strong on NRM/environmental/ecological issues. However, they are short on applied agricultural understanding, a practical understanding of biometry and experimental design, financial/business knowledge and communication skills. These shortcomings slow their entry into being fully productive in the business. An example was quoted that it was at least as important for the new graduate to be aware that selective grass herbicides are used to selectively kill grasses as it is knowing the chemical pathways by which the chemicals operate.

Current concerns include the available number of graduates, the ability to retain them after their initial company training, and their expectations in terms of salary, location and career path – all characteristics of “generation Y”. Historically, new graduates have always learned from business mentoring but the costs of this are high because not only was the graduate not paying their way but the mentors capacity to earn was also reduced.

Issues to be addressed include:

- Graduates need basic skills (verbal and written) for rapid deployment in the business
- There should be a clear path for ongoing development
- There should be more effective interaction between agribusiness (“customer”) and universities (“supplier”) and the development of partnerships. Universities were often seen as agribusiness user unfriendly.
- A greater understanding/affinity for the agricultural system
- An increase in knowledge of agricultural inputs, business and communication
- Graduates were well trained in science and further science depth was unnecessary.

Elders, IHD, CRT and Landmark contacts with whom universities might like to interact were given.

The Needs of the Consultant

David Heinjus, Managing Director of the consulting firm Rural Directions, based in the lower north of South Australia, outlined his experience as he moved from receiving initial mentoring in the South Australian Department of Agriculture to 10 years experience developing a consulting firm with 23 staff operating in SA, Western

Victoria and Southern NSW. Success ultimately depends on the people in the business, encouraged and valued for their innovation and skills, and their ability to develop new methods and solutions for clients giving a measurable and sustainable improvement. This involves process facilitation and technical advising. It is situational with no universal strategy.

Challenges to employing a new graduate include the cost of mentoring, the risk of them leaving (but if not adequately trained, they may stay!), the ability to show the graduate a career path, and the high cost of wages, vehicles, superannuation and training, meaning that it may take 2-3 years before the new graduate “breaks even” in the business. Clients prefer to seek an adviser perceived as “experienced”.

In consequence, Rural Directions seeks excellence in technical advice and process facilitation, practical experience with farm families and small businesses, the ability to work in a team, good writing and verbal communications skills, an awareness of “business drivers”, entrepreneurship and marketing skills, a depth of thinking and practical experience which can be reinforced by study tours if necessary. As a result, the business has developed a self-paced graduate programme, reviewed every six months, to bridge the gaps between graduation and becoming a fully experienced professional consultant.

In Government

Dr Nick Austin, Deputy Director-General, Science and Research, NSW Agriculture reminded the audience that the public support for agricultural research, development and education came 20% from universities, 14% from business, 22% from the Commonwealth and 44% from States/Territory governments. State agency investment is often not recognised and lack of recognition could threaten the supply! The different environment in Australia compared with most other OECD competitors, who are highly subsidised, is also not recognised.

A very wide spectrum of skill sets is needed in government, often with graduates developing their own unique specialist areas. Common deficiencies are communication, interpersonal and business understanding skills. Essential attributes include hard work and perseverance, above average intelligence and political “smarts”, mobility and flexibility, and good communication.

A growth in postgraduate environmental sciences but declining intakes in agriculture was noted. It was also observed that one third of graduates coming from non-metropolitan environments move to the capital cities after graduation. Increasingly, the public sector was receiving applicants born outside Australia, but they were often without rural backgrounds or communications skills. Science and research positions in agriculture are very stable with little staff turn-over.

The changing needs of agriculture revolve around globalisation, natural resource management, biosecurity, information technology and climate change, yet media perceptions of scientific issues are very fluid and changeable – variously bird flu, climate, cloning, water, biofuels, bioterrorism and pollution have had high media attention.

The peak retirement of staff recruited as “baby boomers’ will be in 2010-2015. That is crunch time for the agricultural profession and agriculture generally. The outcome will either be a desperate attempt to recruit new staff, or the opportunity taken by Treasuries to withdraw funding. Increasingly, the public sector will have fewer generalists and more specialists who will be able to work in teams.

The students entering agriculture

Anne Gregory, from the Higher Education Analysis section of the Department of Education, Science and Training outlined the principal Commonwealth funding programmes available to universities and prospective students. She identified demand variability and changes in university courses, being influenced to some degree by what students had to pay. Other issues from a 1999 survey influencing choice were interest in the field (top priority), employment prospects, attainability of the course, with different further priorities depending on the course. HECS level appeared to have no effect.

In recent years, the number of place offers has exceeded the number of applicants, and agricultural places were often taken by applicants expressing it as a 3rd or 4th choice. Completion rates were slightly below average, possibly reflecting lower entrance requirements and capacity to do the course. Those withdrawing quoted that they didn’t like the course, were moving away, found they had no support in the city, the cost of study, or they had a better offer elsewhere. Only 26% of agricultural graduates were working in their chosen field within four months of graduation.

DEST funds Career Advice Australia with a national network of regional industry career advisers and national career specialists. Rural Skills Australia is the contracted career specialist for the agri-food industry (<http://www.ruralskills.com.au/main.html>). (A subsequent perusal of the website showed it largely oriented to TAFE level training and apprenticeships without any reference to university training or graduate employment.)

Training – the Melbourne Model

Professor Snow Barlow, Professor of Horticulture and Viticulture at the University of Melbourne, outlined the challenges faced by agriculture. He noted an increasing popularity of an Agriculture/Commerce five year double degree. The University of Melbourne had now adopted the Bologna model. This consisted of a 3-2-3 year programme involving a three year Animal Science/ Agricultural Science/ Food Science degree post-high school, followed by a two year Honours/Masters programme or a Graduate Certificate / Diploma and professional taught Masters Programme, leading on to a three-year PhD programme for those aspiring to a research career.

Course plans would involve 24 “units” including six “breadth” subjects outside the student’s degree area. Two core subjects would be “systems” subjects, and there would be specialised subjects in fields such as plants, animals, landscapes etc.

New Graduate Schools with graduate degrees would lead to academic excellence, being knowledgeable across disciplines, becoming leaders in their professional communities, fluent between cultures and active global citizens.

The Four-Year degree model

Professor Roger Swift, Dean of the Faculty of Natural Resources, Agriculture and Veterinary Science at the University of Queensland, noted that university student numbers had increased 100%, academic staff had increased 15% and that universities were grossly under-funded. He summarised the plethora of degree options available in Australia, with a total of 174 agricultural qualifications available, including 15 in Agricultural/Rural Science; 14 in Agriculture; 3 in Horticulture; 16 in Agribusiness; 42 in Environmental Science, 18 in Environmental Management and 11 in Applied Science. The major agricultural providers are currently the Universities of Adelaide, Charles Sturt, Melbourne, New England, Queensland, Sydney and Western Australia. Professor Swift expressed the view that the number should be reduced to five or even three.

The content of degrees should be reviewed every 5 years in consultation with stakeholders including industry

The history of the four year degree was outlined. (Australian students enter university one year earlier than in Europe.) Originally, the degrees had involved the basic sciences followed by the applied agricultural sciences and a period of work experience or placement (less common than overseas) leading to good integrative skills. Subsequently the “generalist” degree gave way to a series of (debased?) “specialist” degrees. This was followed by a move towards three year specialised degrees built on a narrow base with limited exposure to basic science.

Student attitudes now seem to be driven by financial rather than educational issues, minimising the time in university and the debt thus generated, and getting into the workforce as soon as possible.

The peak bodies of agri-industry, government and universities need to address and repair the image of agriculture to show it is a modern, successful and technologically advanced career option.

The Bologna model had been primarily driven by achieving standardisation across university education in the European Union, though doubts were expressed as to the extent of its adoption. It was hypothesised that various countries would undertake to adopt but would actually do so with differing degrees of enthusiasm and speed. He posed the question - What more exciting challenge was to be faced than feeding a growing population seeking more animal protein, while adapting to climate change, the need to sequester carbon, and produce biofuels while managing 70% of a finite land area with limited water supply?

Collaborations in recruitment

Dr David Russell of the School of Agricultural Science in the University of Tasmania advised of a DEST estimate of the need for 55 000 extra scientists with only 65% available by 2011. Year 11 and 12 students need to be targeted now to generate a change in the perception of science by building relationships with teachers and students in years 7-12. The agricultural profession needs to engage in teamwork

involving short visits to classes, industry development for teachers and placement opportunities for students with mentors (not just “work experience”). The need for a National Primary Industry Centre for Science Education was outlined (details at https://sciencegrants.dest.gov.au/nias/documents/docs/pdf/stone_science_forum.pdf). The University of Tasmania/ GRDC/DEST model was outlined. It was pointed out that the process was relatively inexpensive, and would be effective in securing more and better quality students whose enrolment would bring \$25 000 each to the university budget.

Collaboration

Dr Rob Lewis, Executive Director, SA Research and Development Institute, outlined a range of collaborations including the Waite Campus Collocation (University of Adelaide / CSIRO / SA Government); the Waite Field Crop Consortium leading to the formation with GRDC of Australian Grain Technologies and a subsequent partnership with the WA Council of Grain Growers Organisations (COGGO); Barley Breeding Australia; Marine Innovation SA (South Australian Research and Development Institute/Flinders University/ University of Adelaide/ SA Museum/ seafood industries and regional communities); and the Wine Innovation Cluster (Australian Wine Research Institute/SARDI/CSIRO/University of Adelaide).

Success in such ventures required clear differentiation and complementary space; science synergy underpinned by excellence; intent, goodwill and respect; leadership at all levels; and patience. They require executable documents leading to fostering cooperation and mutual benefits

These developments have strengthened post-graduate opportunities. SARDI now co-supervises 60 PhDs.

Distance Education and Collaboration

Professor Jim Pratley formerly Dean, Faculty of Agriculture and Science, Charles Sturt University, outlined initiatives to Charles Sturt becoming a leading purveyor of distance education with nearly 20% of the Australian market. He outlined its origins as an agriculture college with the NSW Department of Agriculture in 1976 to become the Riverina College of Advanced Education, and in 1989 to become Charles Sturt University with a research focus. However, it then began to compete with the Department. But by 1995, a joint venture between the University and the Department led to creating the National Wine and Grape Industry Centre and in 2005 another led to the EH Graham Centre for Agricultural Innovation. These involved the CEOs being locked in, having the agricultural grassroots engaged and supportive, industry being involved and the concept embraced by funders.

Pragmatically, collaboration blunts Treasury knives, provides access to new funds and better facilitates postgraduate training. Furthermore, the regional location and additional strength has resulted in 70% of graduates remaining in regional employment, while 44% of agricultural graduates originating from metropolitan areas have stayed “in the bush”. However, the introduction of the Research Quality Framework (rules undefined) to the university sector by the Commonwealth to

encourage direct competition between universities raises serious questions about the ability to receive recognition from the benefits of continuing to pursue collaboration.

A National Collaborative Approach to Skills Development

Vic Dobos from the Grains R&D Corporation confirmed that the GRDC has undertaken a role in capacity building of human capital for the Grains Industry. It is currently investing \$2.5m annually but building it into most of the GRDC business activities. It had noted that more than half of Australia's agricultural scientists are over 50 years old.

Key factors in developing human capital were given as having a solid primary and secondary foundation; access to high quality post secondary institutions; the generation of new knowledge; encouraging individuals to invest in learning; ensuring effective knowledge systems; building a critical mass of organisations and individuals; having recognition of that human capital; and ongoing and effective investment.

From the industry's perspective, the key issues to be addressed are rationalising institutions and programs due to declining demand; addressing changes in course design, student preferences and teaching methods; encouraging a trend towards larger centres to concentrate expertise and reduce costs; balancing short term commercial research imperatives against long term "basic" research; overcoming barriers between universities and TAFE including limited credit transfer opportunities and addressing the general decline in secondary and tertiary participation and performance in mathematics and science.

A number of other challenges coming from a broader base included skills shortages and talent attraction and retention common across all industries and demographic changes that will exacerbate the problem; a growing focus on retraining the existing workforce and boosting workforce participation levels; and an additional problem that high skill jobs are growing, thereby adding to competition at the 'top end'. The Grains R&D Corporation is focusing on those issues where it can make a difference.

The future environment for Agricultural Education

Dr Jacqueline Rowarth, Professor of Pastoral Agriculture at Massey University, Palmerston North, NZ, but recently from Melbourne University, advised that New Zealand had recently been through the "image business", where it takes "10 good things" to wipe out one "bad thing". Australia and New Zealand had been through similar experiences in Agriculture with removal of subsidies, restructuring of research institutions (CRIs, CRCs), greater contestability, and the equivalent of the forthcoming Research Quality Framework.

A consideration of the "Y generation" is salutary. Twenty-seven per cent of them "want to do good", and these should be targeted. Those who go on to work in agriculture will face challenges of land value increases, climate change, the risk of biosecurity failure, the intensification of land use, an increased regulatory environment and a greater expression of customer preference. The "Y generation" have great expectations with their belief that "because we're worth it, we can have it

all”. They have grown up with reward for participation rather than achievement. They obtain all their information from the Web. Elders are no longer venerated. Parents are out of date! As a generation, they consider themselves the most creative, most discerning, most educated, most focussed on work-life balance, the most deserving of responsibility and challenge, and hence most ‘special’!

Employer surveys of anticipated needs over the next ten years suggest that they want graduates with a willingness to learn, having initiative, an achievement orientation, able to provide customer service, have computer literacy, can meet requirements for flexibility, teamwork and co-operation, can display good conceptual and analytical thinking, can build relationships, are always information seeking, and have good written communication skills.

A survey of the potential employees from the “Y generation” after they complete their degrees shows they are being primarily driven in finding their first job by the opportunity for career development (63%), salary (17%), the potential of large companies (15%) and the chance to work in a team (4%).

All aspects of agricultural industries across both sides of the Tasman should be working together.

The expectations of and for Graduates

Mark Chapman, from Lucas Recruiting, commented on the recruiter’s perspective of what the graduates and employers wanted. It appeared that graduates wanted a job location within 20 km of Adelaide. Children brought up on the farm are aware of the geographical and financial frustrations and seek a city lifestyle. There wasn’t much romance to be seen by city people if one was working in agriculture, with city people continuing to hear about such agricultural stories as the continuation of mulesing.

Industry says “where are the agronomists?” There is a lot of R&D but not enough messages to take to the farmer. Farmers must have confidence in the messenger – a huge challenge. Yet opportunities in agriculture are really exciting. There is a need to “razz the business up a bit!” Companies appear frustrated and are seeking graduates with a passion and an affiliation with agriculture. They want to talk to such people and will adjust their “goal posts” to capture them for the company before someone else does so. We need to attract such students into our courses.

The Institute’s Way Forward

It was with the background of these presentations that the delegates to the Australian Institute of Agricultural Science and Technology moved into their workshop discussions to identify a way forward for Australia’s agricultural education.

The Core Issues identified for urgent action were:

- Improving the image of agriculture as a progressive, essential industry and therefore as a career option.
- Meeting the future demands for agricultural professionals in terms of numbers and knowledge/skills required by different sectors
- Closing the cultural gap between industry and universities, and better defining industry needs

- Rationalisation/collaboration of University courses, “smart” systems of delivery.
- Inconsistent/restrictive regulation and the difficulty in getting agreement between the States and with the Commonwealth

The Universities present agreed to the need to address these issues urgently and “rebirthed” the Deans Committee. The Australian Institute of Agricultural Science will take the lead in establishing a TASK GROUP of AIAST, the Deans Committee, Agribusiness, NFF, RDC Chairs and relevant government agencies which will urgently pursue the issues and actions arising from this Conference and Workshop. Progress will be reported in subsequent issues of the AIAST Journal