

**Agriculture at the University of Western Sydney:
A Systemic Appraisal of Past, Present and Potential Futures.**

Report of a Stakeholder Consultation

Part One

The Synoptic Review

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August, 2012

The formal report of the inquiry has been prepared in two parts:

- Part One fulfils the requirements of the Terms of Reference as the Report to be presented to the Executive and to the Board of Trustees. Reflecting the directive from the Steering Committee in response to the submission of a draft report in late June, it essentially confines itself to a synoptic recording of the key findings from the inquiry and the essence of the five identified options that have been generated from them. As further directed, it is written in the point format style of a consultant's report and in its structure, follows both the specific foci and the sequence of the specific Terms of Reference presented at the start of the inquiry.
- Part Two, which is an on-going work-in-progress, consists of an elaboration of material that will be of considerable relevance to the stakeholder discussions and critical conversations about desirable and feasible changes, which, it is assumed, will follow from the release of Part One of the report. Reflecting the experience and scholarship of the author as well as the nature and source of much of the information, ideas and opinions, which are drawn from the extensive literature which is being collected, collated and analysed, it is being written in an academic narrative style.

Part One

The Synoptic Review

List of Abbreviations

HAC	Hawkesbury Agricultural College 1891-1972
HAC(CAE)	Hawkesbury Agricultural College as a College of Advanced Education 1973-1988
UWS-H	University of Western Sydney – Hawkesbury 1989 -2000
UWSh	The Hawkesbury Campus of the University of Western Sydney: 2000 -current

AAAE	Australian Association of Agricultural Educators
ABARE	Australian Bureau of Agricultural and Resource Economics
ACDA	Australian Council of Deans of Agriculture
ACPAC	Australian Conference of Principals of Agricultural Colleges
ACIAR	Australian Centre for International Agricultural Research
ADP	Asian Development Bank
AIAS	Australian Institute of Science
IAIST	Australian Institute of Agricultural Science and Technology
APEDI	Asian Program for Educational Innovation for Development
APLU	Association of Public and Land Grant Universities
ATA	Agricultural Technologists of Australia
AYOF	Australian Year of the Farmer
CAA	Careers Advisors Association of NSW
CAP	Common Agricultural Policy
CMA	Catchment Management Authority
CRC	Cop-operative Research Centre
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CSU	Charles Sturt University
DAFF	Department of Agriculture, Food and Forestry
DPI	Commonwealth department of Primary Industry
DPI	Department of Primary Industry
DSE	Department of Sustainability and the Environment
EFTSU	Equivalent Full Time Student Units
FAO	Food and Agriculture Organisation of the United Nations
GCHERA	Global Consortium for Education and Research for Agriculture
GUNI	Global Universities Network for Innovation
HAC*	Hawkesbury Alumni Chapter of the University of Western Sydney
HAC-OBU	Hawkesbury Agricultural College Old Boys Union
HERDSA	Higher Education Research and Development Society of Australia

ISSS	International Society for the Systems Sciences
NASULGC	National Association of State Universities and Land Grant Colleges
NFF	National Farmers Federation
NGO	Non Government Organisations
PICSE	Primary Industry Centre for Science Education
PIEF	Primary Industry Educational Foundation
RAS	Royal Agricultural Society
TAFE	Technical and Further Education
UNE	University of New England
UNESCO	United Nations Educational Social and Cultural Organisation
USAID	United States Agency for International Development
VET	Vocational Education and Training
VFFF	Vincent Fairfax Family Foundation

1 Executive Summary

Overview

- 1.1 The present multi-stakeholder inquiry into agricultural education at the University of Western Sydney, which combined semi-focused interviews and critical conversations with considerable desk-research, was conducted over a four month period between March and June 2012.
- 1.2 The presentation of this final report has been delayed by a number of international commitments.
- 1.3 `The 'presenting issue' for the inquiry was the decision by the University not to proceed with a 2012 intake for students in agriculture. This position was taken in response to the very low level of applications by prospective students for the new Bachelor of Natural Science (Sustainable Agriculture and Food Security) course at the Hawkesbury campus.
- 1.4 The context for the inquiry was set by the University's commitment "to continuing to explore the possible innovation of course offerings in agriculture disciplines and opportunities to address the long-standing continuing decline in demand for agricultural education at the University" which has mirrored the situation at large across all other universities in Australia – and indeed in many other countries across the globe as well.
- 1.5 From the start it must be said that the matter is extremely complex and demands a level of attention and application that far transcends the all-too-common view that it is a simple matter of increasing the intake of students into agricultural studies at universities through more active and focussed marketing.

Broad Context

- 1.6 The inquiry was carried out in parallel with a national government Senate inquiry - *Inquiry into Higher Education and Skills Training to Support Future Demand in Agriculture and Agribusiness in Australia* – which had been due to release its report in March at the time the present investigation was launched. In the event, that report was not available until late June.
- 1.7 It can be claimed that this is a time of almost unprecedented national interest in agricultural education in Australia:
 - Two other reports from national inquiries into agricultural education have been published within the past two years;
 - Inquiries, conferences and 'round table' discussions have been/are being conducted by such bodies as the National Farmers Federation, the Australian Institute of Agricultural Science and Technology, the Royal Agricultural Society of NSW, and other industry and professional bodies that even extend beyond agriculture, such as the Careers Advisors Association of NSW;
 - The Australian Council of Deans of Agriculture, which was established formally in 2007, following an earlier informal initiative in 1991 launched at what was then the University of Western Sydney Hawkesbury, has been active in lobbying and publishing papers relating to the matter;
 - A number of academics from Australian universities have been publishing items on the topic in the popular press as well as in articles in journals and trade publications;

- Both the Primary Industry Centre for Science Education and the Primary Industry Educational Foundation have been actively contributing to the public discourse;
 - A set of 'Australian Year of the Farmer' initiatives were launched by the Governor General in October 2011 is further amplifying the topic.
- 1.8 The essential motivation for the majority of these broader national initiatives has been to investigate the anomaly of declining enrolments in higher agricultural education (and thence the limited supply of graduates) under circumstances where the demand from the current employment market is reported to exceed that of supply by a factor of four or five.
- 1.9 While many recommendations for change are emerging from these reports, there is a depressing repetitiveness about them, echoing as they tend to do, ideas and proposals for change that were first reported almost fifty years ago and that have been recurrent in many subsequent publications (even while many changes have indeed occurred over that time in society at large, in agriculture and in tertiary education).
- 1.10 These recommendations also reflect the prevailing focus of most of the current Australian studies and activities seeking change to the circumstances of the day, on increasing the 'supply' of graduates for employment markets to meet the immediate and projected 'demand' for such graduates by employers in both public and private sectors.
- 1.11 In marked contrast to the approach taken in a number of other countries – most notably the USA and some European nations – little attention has been (or is currently being) paid in Australia to the matter of how universities that are involved in agriculture and related disciplines need to respond to the very significant intellectual, moral, practical and organisational challenges that the future development of sustainable agri-food systems has already begun to dictate.
- 1.12 In the light of this – and indeed within the spirit of the Hawkesbury campus's long-adopted 'visionary tradition' and record of innovation throughout its long history - the compass of the present investigation has extended significantly beyond the relatively instrumental issue of supply of and demand for agricultural graduates.
- 1.13 Accordingly, this inquiry has embraced the more comprehensive (and responsible) matter of the role that the University of Western Sydney might play in the future development of sustainable productive agri-food systems in this country in the broad context of inclusive well-being of people and their bio-physical environments alike.

Approach and Methodology

- 1.14 The complexity of these matters demanded the adoption of a systems approach to the inquiry and the use of formal systemic methods of analysis which relied as much on desk research and action research processes of critical conversation as on direct personal stakeholder interviews.
- 1.15 As the opening gambit of the project, a dynamic systems model was generated as the conceptual framework for guiding the process as well as for allowing the identification of the key 'flows' or pathways that needed investigation and the critical 'sets' of influence on those flows. Together, these elements of the system also allowed the identification of key areas for inquiry and major stakeholders with whom to engage.
- 1.16 More than 100 individuals who could be identified as having key interests in, or concern for agricultural education at the University of Western Sydney, or who might be affected by

decisions relating to it, were selected from among a very wide constituency of possible stakeholders and engaged - directly or indirectly - in focused and semi-structured conversations that addressed the two central questions of the inquiry distilled from the Terms of Reference.

- How had the situation that had led to the suspension of the agriculture course at the University of Western Sydney in 2012, arisen?
- What might/should the University do to rectify the current situation? (If indeed anything beyond withdrawing from the endeavour altogether)

- 1.17 A similar number of written reports, submissions, academic and technical articles, and monographs were also accessed during the project and these have been collected and collated as a resource for future stages of the project. Daily newspapers were also monitored.
- 1.18 In the spirit and context of systems approaches to investigation through critical conversation, and in contrast to conventional consultancy reports, no specific attributions are recorded in this part of the report for any of the information and data that were revealed through the recorded interviews or even, for the most part, from the published material. Rather they have all 'been wrapped' into the material presented here as contributions to an overall narrative.

Trends at UWS and Elsewhere

- 1.19 The claim that the situation at the University of Western Sydney with respect to enrolments in agriculture has reflected a national trend, was indeed confirmed by data published by the Australian Council of Deans of Agriculture as well as from other sources.
- 1.20 National data published for graduation completions in agriculture for the period 2001-2006 revealed that the situation at UWS was among the most volatile of all and was in the most serious decline when compared with the data from all of the other universities that offered three year undergraduate degrees in agriculture in Australia over that period of time.
- 1.21 While no data comparable to that produced by the ACDA was uncovered for other countries, reports and conversations with colleagues from the USA, New Zealand, the UK, and a number of other European nations certainly revealed considerable volatility in enrolments in undergraduate courses over recent years.
- 1.22 In a number of countries, including the USA and New Zealand, the numbers of agricultural enrolments have increased over the past few years, while the same is true for particular institutions within countries including the UK and Switzerland.
- 1.23 While comparisons with situations in other countries that offer agriculture and related endeavours is complicated by a number of very significant factors, information and data from overseas institutions have provided a number of important insights for potential innovative change at UWS.
- 1.24 More detailed analysis of the changes that have occurred over the past 20 years of the University of Western Sydney in relation to agricultural and horticultural education revealed a complex and dynamic picture.
- 1.25 In spite of almost continual attempts to adapt to changing circumstances, an untenable decline in both agriculture and horticulture first year enrolments has occurred at UWS starting as early as 1998 - following the peak position the year earlier – but greatly accelerating from 2007 onwards.

- 1.26 In 1997, the cohorts in both domains were as strong as they had ever been in the history of the university - or of Hawkesbury Agricultural College before that.
- 1.27 As the university has grown and diversified in the significant manner that it has, so agriculture, which is an expensive academic domain to support, has continued to decline in both relative as well as absolute numbers, to the point where, for a number of years now, agricultural education at UWS has been economically non-viable and in related ways, untenable.

Historical Overview

- 1.28 With Hawkesbury Agricultural College (HAC) as one of its three foundational Colleges of Advanced Education, the University of Western Sydney can claim a heritage in education in agriculture that extends back over more than 120 years.
- 1.29 As revealed in a national review of agricultural and related education conducted in 1991 – just two years following the establishment of the University of Western Sydney - the total enrolments of students in agriculture and other related endeavours at UWS (including horticulture, food and agricultural extension) were the highest of any single Australian university.
- 1.30 Following strategic intentions first adopted when HAC became an autonomous College of Advanced Education in the mid-1980s, the profile of the agriculture courses by 1991 included associate diplomas, undergraduate degrees, postgraduate diplomas, and coursework and research masters. The first PhD students in agriculture were also enrolled that year.
- 1.31 The overall undergraduate agriculture enrolments would continue to increase up to their peak in 1997, essentially through the introduction of three new courses (in agribusiness in 1992, landscape management and conservation (jointly with horticulture) in 1996, and equine studies in 1997). None of these new courses however would survive beyond a decade following their introduction.
- 1.32 The relative consistency of the undergraduate degree period up to 1997 reflects the quota cap while providing no indication of any adjustments that might have been made in tertiary entry scores to achieve those quotas, nor the rates of attrition or graduation.
- 1.33 The decline in first year enrolments in agriculture and horticulture *post* 1997 have mirrored each other with an astonishing equivalence even though they were offered by different groups of academics working in different organisational units, with very different pedagogical approaches and curricula, and servicing quite different employers.
- 1.34 Many factors have clearly been involved as sources of influence on the dynamics of student enrolments in agriculture and related domains at UWS and given the inherent complexity of the matter, it is impossible to attribute single causes for particular changes – nor thus mount simple recommendations for change.
- 1.35 There are many lessons that have been drawn from a study of the situation particularly as they relate to such matters as
 - government policies in both agriculture and education
 - conditions in the rural sector and its public image and the public image of agriculture and farming
 - institutional identity and the significance of ‘brand’ and its reputation

- cultural reform
- academic organisation and translocation
- academic leadership
- resource management
- marketing and the importance of 'presence'
- collaboration across different academic domains
- collaboration with agricultural industries, other professional bodies as well as rural communities
- budgets, funding models and decision environments
- innovation and institutional transformation, and
- lost opportunities

Decision Context

- 1.36 Education, in both agriculture and horticulture at UWS, has clearly been untenable for a number of years. Low numbers of continuing students and abysmally low applications at the start of 2012 left the program financially non-viable.
- 1.37 The latest structural reforms of the university, launched this year with the responsibility for the Natural Science courses being transferred to the newly established School of Science and Health, has put an even greater emphasis on the need for educational programs to evidence their financial sustainability within an open-capped and ever-more financially constrained environment.
- 1.38 The decision not to admit a first year intake into the agriculture degree was taken with cognisance of the possible implications for existing academics at UWS who are currently still involved in agricultural education, as well as appreciation of the situation with regard to the extensive land holdings which are currently gazetted by the NSW government for educational purposes.

Key Issues

- 1.39 Most of the key issues impacting on current agricultural education in Australia have been identified and elaborated in submissions to, and reports of the national inquiries and other investigations. The majority of these also pertain to the situation at the University of Western Sydney.
- 1.40 Four general themes continue to repeat themselves:
- How to increase student enrolments in undergraduate courses in agriculture under circumstances where demand for graduates is grossly under-supplied;
 - How to most effectively and efficiently provide them with a relevant education;
 - How national efforts can best be co-ordinated through a 'peak body' representing a wide range of stakeholder groups; and
 - How to contribute more generally to the continuing sustainable development of Australian agriculture.

- 1.41 Most of the attention of past and of current inquiries into agricultural education, both generally and within the university itself, have focussed on the first three of these issues and usually in singularly instrumental and linear ways.
- 1.42 While these are, of course, very vital dimensions, the far greater long-term challenge is that posed by the fourth of these issues which essentially calls for major intellectual and moral transformations in the prevailing paradigms of research and education in an agriculture that must now be set within a context of sustainability in its broadest possible ethical, social, ecological and economic contexts.
- 1.43 This demands nothing less than a shift in paradigms from 'productivism' to 'sustainableism'.
- 1.44 Like the industry and sector that it services, agriculture education is typically fragmented and replete with a wide variety of tensions of difference which reflect greatly varying worldviews as well as motivations and aspirations. Management of these tensions and conflicts presents a major challenge to any institution or organisation that attempts to transform prevailing situations.
- 1.45 Management of tensions, conflicts and systemic uncertainties also represents critical areas for competency development for future generation of agriculturalists for the agriculture of tomorrow will almost assuredly be very different from that of today with a number of 'macro-trend' challenges already apparent.
- 1.46 The call is for a new 'agricultural science' that embraces the human experience as well as knowledge from the bio-physical sciences, the socio-cultural sciences, and the humanities. This in turn dictates the need for curriculum and pedagogies that will significantly differ from those that have traditionally characterised education in agriculture and related academic domains.
- 1.47 It is not sensible for a single institution like the University of Western Sydney, to engage with these very complex matters in isolation, particularly given the greatly diminished corps of agricultural academics that still exist within the institution. What the university could do, however, would be to forcibly enter the prevailing discourse about the future of agriculture – the 'narrative' as it has recently been labelled in the Senate report on agricultural education – and help to transform it.
- 1.48 Leads can be taken from the United States in particular, where, in contrast to the situation in Australia, the focus is essentially on how agricultural education needs to be transformed or even revolutionised to meet the needs of a changing world.
- 1.49 There is also much more emphasis in both the United States and other countries overseas on the changing role of universities in society through contributions to public discourse and policy-making through processes of critical engagement and the generation and promulgation of new paradigms of development.

Ideas and Proposals

- 1.50 Countless ideas, opinions and proposals arose during the course of the inquiry emerging from the stakeholder conversations and as revealed in submissions to, and reports of other inquiries (internal as well as national), from the academic and technical literature, and even from the media. The responses ranged from the frankly nostalgic through to the radical.

With but very few exceptions, all were proffered within a strong sense of good-will for the university and an enthusiasm to assist in any change process instigated by the institution.

- 1.51 The stakeholders interviewed held a sense of genuine regret and a significant amount of despondency that the University had been forced to take the decision to suspend enrolments for the agriculture course for this academic year. And there was also an overwhelming support for the institution's attempt to investigate the matter and to seek ways of improving the situation.
- 1.52 Some stakeholders did wish to blame the university for what was perceived to be a 'benign neglect' of agricultural education with a few even expressing to anger, these were very much in the minority however, and were characterised by the fact that they had little to offer in ways of ideas or proposals for creative change for the better.
- 1.53 The particular items included later in the text (and framed as verbs for action) were selected from a panoply of thoughts and recommendations, essentially because of their usefulness in the generation of options that represent the major outcome of the inquiry.

Options for Further Consideration

- 1.54 The second major motivation for this inquiry, beyond trying to establish the reasons for the decline of agricultural education at the University of Western Sydney, was to generate and present a number of options for potential future programmes in agriculture and/or related domains as vehicles for discussions and debates about desirable and feasible transformations.
- 1.55 In this regard five such options have been derived from the information and data that emerged through the conversations conducted during this inquiry and the concurrent access to the literature.
- 1.56 The five options are not presented as exhaustive or exclusive nor are they presented as recommendations. They follow the logic and content of the issues raised above and can be interpreted in some manner as a progression from that which might be achieved in the short term through to much more radical proposals for a focus not on agriculture or horticulture *per se* but on a major transformation of the entire Hawkesbury campus in its dedication to sustainable development or sustainable wellbeing as its thematic identity – a Hawkesbury Institute for Sustainable Wellbeing perhaps.
- 1.57 Each option has been given a title to identify it.

1.57.1 The Present Augmented

- The first most obvious option, of course, is to focus intensively on promoting the 3 year undergraduate degree course that is already on the books: B.Nat.Sc. (Sustainable Agriculture and Food Security).
- Advantage can be taken to restructure and re-badge the programme for introduction in the 25th anniversary year of the university in 2014.
- It could be explicitly presented as one of four majors within a cluster that includes Animal Science, Horticulture, Nutrition and Food, Health and Agriculture but under a rubric different from Natural Science.

1.57.2 The Past Re-cast

- The second option is to re-explore opportunities for the integration across a number of different domains that were present on the Hawkesbury campus at the time of its incorporation into the university as a reflection of the strategic intentions that were set

in the late 1970's at the then Hawkesbury Agricultural College to transform itself into a comprehensive institution but which were subsequently lost for a variety of reasons in the mid-1990's.

- The success of these strategies was indicated by the diversity of the programs and emerging research efforts in, at the time of incorporation into the university: These included, social ecology, land economics and commerce, business studies, landscape management and conservation, environmental science and nursing, tourism and recreation, in addition to the traditional areas of agriculture, horticulture and food. Initial steps had also been taken to introduce the humanities.
- While the majority of these endeavours no longer currently exist on the Hawkesbury campus, opportunities for the introduction of new multi-disciplinary courses, perhaps grouped around a single theme, could still be eminently possible by drawing on academics from across the entire university.
- In a number of very significant ways this represents the essential logic of the course that was developed by the agricultural group in 2011 under the rubric of sustainable agriculture and food security. Indeed, at first glance, this option could be interpreted as merely an expansion of Option One.
- However, in contrast to the situation presented in that option, students would enrol in a generic programme of studies that extended significantly beyond the 'natural' or biophysical sciences to also include some social sciences and aspects of the humanities. This of course is a long established practice, with many universities around the world adopting the concept of 'majors' as specialised options of study following preliminary years either of liberal studies or studies of the basic sciences.
- Both the universities of Melbourne and of Western Australia have recently adopted a model similar to this and based on what is referred to as the Bologna system. In essence this entails five years of university study that concludes with a Masters degree in the major specialisation.

1.57.3 *The High-Tech Future*

- Science-based technologies have long been the basis for improvements in productivity in agriculture as with medicine. The range of these innovations extends from applications to improve the fertility of soils and the efficient use of water, through to the control of plant and animal diseases, the design of controlled environments, nutrition and applied genetic breeding of crops and livestock, informatics, robotics, nanotechnology and rDNA technologies.
- Advanced science and its application as innovative technologies will be absolutely foundational to the further development of agriculture across the world which will in turn dictate the need for graduates in advanced science and technological development. The role of agricultural studies in this context would be solely to provide a context for the techno-scientific studies.
- This third option then pursues quite a different line of logic from the previous two. The approach here would be to introduce agriculture as one major within a degree in advanced science and technology.
- While the Hawkesbury campus has little experience traditionally in what might be referred to as science-based high-tech research or development there are certainly those across the university as a whole who have exemplary records in such activities.

- The establishment of the Hawkesbury Institute for the Environment and the Solar Energy Technologies Group, on the Hawkesbury campus already represent a potential source of researchers and academics to support the establishment of undergraduate studies in advanced science and technology as it relates to the developments of high tech agriculture, horticulture and the environment. There are also scientists on that campus who are employed by the NSW Department of Primary Industry.
- Scientists at other locations across the university could also contribute to this initiative which would have the potential of attracting those students with aspirations to combine advanced studies in science with their practical application in agriculture through the development and application of innovative technologies.
- Far from its traditions in vocational education, Option Three presents an entirely different trajectory both for agriculture and related domains and the historical traditions of the Hawkesbury campus.

1.57.4 *McColl Revisited*

- In contrast to the situation in the majority of the other states which have essentially centralised agricultural education into one or at most two universities, New South Wales continues to have four universities that offer degrees in agriculture.
- Attempts have been made in the past to resolve this situation: In 1991 the University of Western Sydney Hawkesbury was not nominated as one of the providers in agriculture and related endeavours in the McColl report released in that year.
- The authors of that study had argued in recommendation 10.5 *inter alia* that the government of NSW should '*as a matter of urgency.... establish a task force to address the question of the emergence of a single recognised provider of agricultural and related education in their respective regions.*'
- The Sydney region was one of seven such regions recognised but the nomination for that was left open and has stayed that way to this day.
- This option provides the university with an option to regain opportunities that were lost two decades ago.

1.57.5 *Sustainable Development/Sustainable Wellbeing*

- This is certainly the most radical and potentially transformative option of the five which, in many ways however, further amplifies initiatives that already have considerable momentum within this university with its emphatic commitment to sustainability and sustainable development in their broadest interpretations. This commitment has been reinforced only within the past few days by a statement from the Vice Chancellor announcing that UWS has given its endorsement to the higher education treaty on education for sustainability which is being discussed at the UN Conference on sustainable development currently being held in Rio de Janeiro.
- The Office of Sustainability at the University of Western Sydney is already showing outstanding leadership in illustrating how the principles of sustainability can be interpreted into actions. Their recognition by the United Nations is ample evidence of the quality of this work which includes involvement with the River Farm which is part of the Hawkesbury estate although not directly contiguous with it.

- And there are of course the major research initiatives of the Hawkesbury Institute for the Environment and the Solar Energy Technologies Group.
- The University of Western Sydney has an opportunity that is probably unique in Australia to dedicate an entire campus to the pursuit of development within the context of sustainability, and to offer a diverse range of courses, that would include agriculture, within that rubric. This is captured in the statement of desired characteristics included in the Master Plan for the Hawkesbury Campus.
- What is envisaged here is for the entire Hawkesbury campus to constitute a single Institute dedicated to manifold expressions of sustainable living which, most importantly, must include the design and development sustainable of agri-food systems.
- Undergraduate education would be regarded as just one of the multi-functions of such an endeavour.

1.58 Each one of these five options has very significant implications with respect to finance, resourcing and organisational transformations. Most importantly each dictates the need for effective, efficient and visionary leadership. These issues will form very important strands in the conversations and discussions that should follow on from this inquiry within the spirit of the university's commitment for seeking potential avenues for the further development of agriculture and the related domains.

1.59 It would be a serious omission if a sixth option was not identified: That of the university withdrawing completely from agricultural education at least for the foreseeable future. It would not be the first university in NSW or other places around the world to do so (the University of NSW abandoned its endeavours in wool and pastoral science in the mid-1990s while Wye College which was for more than 100 years the agricultural faculty of the University of London had its doors closed in 2010).

2. Introduction

The Presenting Issue

- 2.1 In January 2012, the University of Western Sydney took the decision that, in the face of very low application numbers from potential students, it could not justify an intake of students into the (newly redesigned) undergraduate degree course in agriculture (Bachelor of Natural Science – Sustainable Agriculture and Food Security).
- 2.2 As a consequence of this situation, the University further announced that a decision had been made to launch a review into issues impacting on current and potential future agriculture programs at UWS. The author was approached and agreed to conduct “an initial investigation into this matter in consultation with a spectrum of relevant stakeholders”.
- 2.3 Terms of Reference¹ were issued, and the investigation, which was expected to extend over a period of three months or so, was formally commenced during the first week of March.
- 2.4 The logic for the project, which was presented in a joint statement issued by the acting Vice-chancellor and the Dean of the School of Science and Health, was that for some time the enrolments in Agriculture and related programs at the University of Western Sydney, as at the

¹ Attachment One

majority of other Australian universities, had been in decline. Notwithstanding various program reviews that had been conducted over the years starting as early as 1993, and an array of marketing initiatives, the University had been unable to increase enrolments to a viable level. This situation culminated in the University's decision not have an intake into the new program in 2012.

- 2.5 A further rationale for both actions was offered in statements from the Dean of Science and Health (Professor Gregory Kolt) to the effect that: "The changing nature of agriculture in Australia and the decline in agriculture course enrolments across the sector means we need to recast the whole idea of what it means to be an agriculturalist today"... "We are committed to exploring the innovation of course offerings in agriculture disciplines and opportunities to address the historical decline in demand for agriculture education, which is not unique to UWS but rather a nationwide issue".
- 2.6 Finally, there was the intended initiative to be taken by the university to increase student engagement and recruitment through the Primary Industries Centre for Science Education (PICSE) which was to be supported by joint funding comprising a gift from the Vincent Fairfax Family Foundation and a contribution from Structural Adjustment funds received from the Commonwealth.

A National Context

- 2.7 The present UWS inquiry was propitiously conducted at a time of almost unprecedented national attention being given to education and training in agriculture and related endeavours under circumstances where the numbers of students enrolling in higher education programs in agriculture across Australia has been declining now for more than a decade.
- 2.8 Two national inquiries into agricultural education had been completed in very recent times in Australia², with a third due to present its report at the time of the launch of the UWS project in March. Unfortunately, in the event, the release of this report³ was delayed until late June – a time which was concurrent with the submission of the draft report of the current project!
- 2.9 Other national initiatives of immediate relevance in this context included those by the National Farmers' Federation, the Australian Institute of Agricultural Science and Technology, the Australian Council of Deans of Agriculture, the Australian Farm Institute, and the Primary Industry Education Foundation. Meanwhile, the Australian Year of the Farmer project, which was launched by the Governor General in October 2011, would provide unprecedented exposure to farming and to agriculture to a very broad swath of the Australian citizenry.

Substantive Issues

- 2.10 Regrettably, and in very marked contrast to endeavours in other countries including the USA, the UK plus a number in Europe, the essential focus on virtually all of these initiatives was on the 'supply/demand' dimension in agricultural education under the present anomalous circumstances where the 'demand' for graduates is reported to outweigh the 'supply' by a factor of four or five.

² *Workforce, Training and Skills Issues in Agriculture*, a report to the Primary Industries Ministerial Council by the Industries Development Committee Workforce, Training and Skills Working Place (October 2009), *Rebuilding the Agricultural Workforce*, a report to the Business/Higher Education Round Table from the Allen Consulting Group (January 2012)

³ *Higher Education and Skills Training to Support Agriculture and Agribusiness* a report from the Senate Education, Employment and Workplace Relations References Committee (June 20, 2012)

2.11 The recommendations from the Rebuilding the Agricultural Workforce inquiry conducted by the Allen Consulting Group well exemplify this with its ‘interventions’ grouped into three categories:

- Next Generation
 - School outreach and engagement – University students working with schools to include agriculture in the curriculum.
 - Science teacher professional development – Development of school science teachers to include agricultural knowledge and teaching materials.
 - Agriculture career awareness – Promote agriculture career pathways through agricultural shows and expo type events.
- Product Development
 - Rebranding of degree programs – Branding degrees with areas of greatest areas to students, rather than as ‘agriculture’.
 - Reorientation of course content – Course redesign and restructuring to better meet market needs and requirements.
 - Flexible delivery – Support for part-time or online course delivery while students remain on the farm or in industry.
 - Fee discounts – Reduce fees for agriculture degrees.
- Industry Focussed
 - Industry engagement – Substantive engagement with industry regarding degree content and graduate attributes.
 - Industry experience and projects – Industry projects included degree programs.
 - Scholarships – Offer scholarships for agriculture degrees.
 - Cadetships and mentoring – Offer cadetships and mentoring school leavers, to combine work with a degree.
 - Pathways to higher education – Rethink the pathway from school to agriculture programs at university, including entry requirements.

2.12 While there is much rhetoric in this country about the ‘need’ for many more graduates to face the emerging challenges of the future - such as climate change, increased food safety and security, increased international demand for food, competing claims for the use of resources such as land, energy and water, attention to the ethical, social and ecological demands of agri-food system sustainability and so on - there is little apparent focus on the need for new profiles of competencies for the agriculturalist of the future nor on the development of innovative curricula or pedagogies to meet these challenges .

2.13 In this regard, the matter of ‘recasting the idea of the contemporary agriculturalist’ and of ‘exploring innovative responses to emerging opportunities’ raised by the Dean of the School of Science and Health provided the licence for the boundaries of the present investigation to extend significantly beyond a simple focus on increasing student enrolments in agriculture at UWS or on seeking to meet the ‘demand’ of employers through the ‘supply’ of graduates with competencies suited solely to the current and projected requirements of the ‘industry’.

2.14 An added impetus to this extension beyond merely increasing student numbers was the Dean’s reminder that “UWS is also part of a one million dollar project funded by the federal government’s structural adjustment fund to explore strategic alliances to deliver research and undergraduate teaching in agriculture, food and environment.”

Approach and Methodology of the Investigation

2.15 As the issues to be investigated in the course of this inquiry are as inherently complex as they are dynamic, the decision was taken to approach the project from a systems perspective which would entail the adoption of a number of different processes drawn from three formal systems (systemic) methodologies – systems dynamics, soft and critical systems methodologies, and systemic development.

2.16 This approach proceeded through five different stages of investigation:

- the recognition and expression of the complexity and dynamics of the situation under review;
- the identification of the essential ‘pathway flows’ of the situation expressed as a ‘dynamic system’ that would structure the inquiry;
- the identification of the fundamental sources of stakeholder influence on the ‘systemic flows’ and of key representatives from the stakeholder domains that were recognised in this manner;
- the gathering of information, data, ideas and opinions from the identified stakeholders, through interviews and critical conversations; and
- the generation of different options to be used as foci for further stakeholder conversations set within the context of transformations for desirable, feasible and responsible ‘changes for the better’.

2.17 In essence, two basic themes would provide the overall focus for the critical conversations:

- What have been the key factors – both within and beyond the University of Western Sydney - that have been contributing to the decline in student applications for agricultural courses at UWS over past years and which might have led, as a consequence, to the eventual suspension of enrolments for 2012?
- What options might the university now consider in response to this situation set within the context, as formulated in the Terms of Reference for the inquiry, “as the University works towards an agenda for new approaches to agricultural education at this institution”?

2.18 The motivation here was not to seek to apportion blame for what had happened in the past, but to seek lessons from the events and ideas that could be used to guide actions for the future. As was anticipated, the outcomes of conversations that focused on the first question did indeed inform responses to the second.

The Report

2.19 The formal report of the inquiry has been prepared in two parts:

- Part One fulfils the requirements of the Terms of Reference as the Report to be presented to the Executive and to the Board of Trustees. Reflecting the directive from the Steering Committee in response to the submission of a draft report in late June, it essentially confines itself to a synoptic recording of the key findings from the inquiry and of the bare essence of the five identified options that have been generated from them. As further directed, it is written in the point format style of a consultant’s report and in its structure, follows both the specific foci and the sequence of the specific Terms of Reference presented at the start of the inquiry.

In the spirit of a systemic inquiry, no attempt has been made to attribute specific contributions to named individuals.

- Part Two, which is an on-going work-in-progress, consists of an elaboration of material that will be of considerable relevance to the stakeholder discussions and critical conversations about desirable and feasible changes, which, it is assumed, will follow from the release of Part One of the report. Reflecting the experience and scholarship of the author as well as the nature and source of much of the information, ideas and opinions, which are drawn from the extensive literature which is being collected, collated and analysed, it is being written in an academic narrative style.

3. Attachments

- 1) The Terms of Reference
- 2) The Systems Dynamic Model
- 3) Stakeholder Details
- 4) National Data for Trends in Total Graduations in Agriculture
- 5) Synoptic Figure Illustrating Nature, Scale and Dynamics of Student Commencements in Agriculture and Related Academic Domains, and Associated Structural Amendments at UWS, since 1989
- 6) Table Illustrating Fate of Agricultural Colleges following Dawkins Reforms as well as Overview of the Organisational Structures and Programmes of Key Current Providers
- 7) Table from McColl Report illustrating the National Situation in Agricultural Education in 1991
- 8) A Conceptual Model of Agriculture and its Environments

4 Recommendations

- 4.1 As determined by the Terms of Reference, the major output of this present inquiry is a set of options that can be used as a focus for further discussions and critical conversations among key stakeholders as the University moves towards decisions about its possible future involvement with education and research in agriculture and related domains.
- 4.2 The recommendations that are presented here relate to the process by which the next stage in the endeavour might most effectively be facilitated.

4.2.1 *Recommendation One:*

A small dedicated UWS Task Force be created to facilitate widespread discussions and debate within and beyond the institution around the options about desirable and feasible changes for agriculture and related academic domains at the University.

4.2.2 *Recommendation Two:*

This Task Force should comprise a mix of academics and administrators from within the university and should include at least one external member from the 'industry' with a commitment to agricultural education.

4.2.3 *Recommendation Three:*

The leader of the Task Force should be a senior UWS academic with a background in agricultural education who will be released from his or her other main university duties for a twelve month period to concentrate on the task at hand.

4.2.4 *Recommendation Four:*

The Task Force leader should actively and critically engage with those who are intimately involved with a number of key national and State initiatives concerned with higher education in agriculture and related domains. These include the Australian Council of Deans of Agriculture, the Australian Institute of Agricultural Science and Technology, the Australian Farm Institute, the Royal Agriculture Society, the National Farmers Federation, the NSW Farmers Association, the Primary Industries Educational Foundation, the Primary Industry Centre for Science Education, and most importantly, with the recently announced NSW Government Review of Agricultural Education to proceed over the next 12 months, plus any follow-up activities from the recent Senate, Business Round Table, and Industry Development Committee Workforce reviews.

4.2.5 *Recommendation Five:*

The Task Force should establish a network of focus groups to further the debates about desirable and feasible change across the entire State and chaired and organised by agricultural alumni from the University of Western Sydney with a number of these already having expressed a vital interest in being involved. A particular focus should be on the challenges of the future, and 'foresighting' techniques such as scenario planning should be introduced.

4.2.6 *Recommendation Six:*

The Hawkesbury Foundation and the University Development Office should be approached to establish ways and means by which this endeavour could be effectively financed.

5 Key Stakeholder Identification.

5.1 By conventional dictionary definition, stakeholders are those who have an interest in, or concern for, some particular matter or issue another. From the supply/demand 'market-oriented' perspective that dominates the current discourse related to higher agricultural education, the two major categories of stakeholders are identified as (a) the providers of education and (b) the employers of the graduates from those providers.

- The major focus for the providers – ie. universities, colleges and other educational institutions that offer agriculture and related disciplines – is the recruitment, education and graduation of its students. For employers it is the recruitment and employment of the graduates.
- The systems model (Attachment 2) that was generated as a framework to guide the present inquiry illustrated that not only were the constituencies of stakeholders much more complex than this simple duality would suggest but that two different 'pathways' or 'flows' needed to be addressed: The first related to the 'flow' from the pool of potential enrollees through to the pool of potential positions – the 'supply/demand' pathway - and the second to the flow from the pool of potential enrollees (who might differ from their counterparts) to 'potential/future' positions which have yet to be envisaged let alone created.
- This latter pathway is of profound significance in the present context of exploring options that the University of Western Sydney might explore with respect to its potential involvement in agriculture in the future.
- As the model indicates there are a significant number of sources of influence that affect these two pathways.
- Thus in addition to the primary stakeholders identified above, this model also recognises that there are other groups of individuals and/organizations that can have varying degrees of interest, concern or influence on both the 'supply/demand chain' and what might be termed 'supply/future need chain'.
- Eleven different categories of stakeholders were identified from the model and a list of the individuals and group representatives who were engaged in the conversations related to this inquiry are listed elsewhere (Attachment 3) following the systems schema.
- Respecting the requests from a number of those involved, no attempt has been made to identify the names of particular individuals.

6 Points of Discussion and Critical Themes of Conversations.

6.1 Two particular questions have provided the framework for the inquiry itself:

- What factors and prevailing circumstances – both within and beyond the University of Western Sydney – had been critical in the lead up to the suspension of enrolments into the agricultural undergraduate degree for 2012 in the face of very low applications for the course at the institution?

The focus here was not to seek to attribute blame for why things failed, but to learn from past events and experiences in a manner that might sensibly and creatively inform the future: In essence it was a search for insight that can be gained from hindsight.

- What options might the university now consider in response to this situation within the stated context in the Terms of Reference *“as the University works towards an agenda for new approaches to agricultural education at this institution”*?

Here the focus was on the exploration of potential scenarios for the future as well as present trends, again to inform what might be done next: In this case it was a matter of what can be learned through foresight.

- 6.2 Two further questions of particular relevance were also asked to those within the university:
- Why is this situation a matter of concern for the University?
 - What would the institution gain by resuscitating an academic domain that appears to be moribund?
- 6.3 The very nature of the terms of reference was such that much of the information and data relevant to the inquiry was sourced most appropriately from published material rather than through interview. A comprehensive list of references that have been cited during the course of the project is attached at the end of Part Two of the report. .

7 Recent Trends in Enrolments in Agricultural Education at UWS and at Other National and International Institutions of Agricultural Higher Education.

- 7.1 The claim that the situation at the University of Western Sydney has reflected a national trend was indeed confirmed by data published by the Australian Council of Deans of Agriculture as well as from other sources. That stated however, the figures for UWS for graduation completions for the period 2001-2006 revealed that the UWS situation was among the most serious when compared with the data from all of the other universities that offered three year undergraduate degrees in agriculture at that time (Attachment 4)⁴.
- 7.2 These trends seem to be counter intuitive, as they in no way reflect job and career prospects for agricultural graduates under circumstances where the current demand from employers for agricultural graduates outweighs the supply by a factor of four or five, as published data have revealed. Evidence is presented in a recent document published by an academic from Charles Sturt University that *“more than 4000 jobs per year are consistently being advertised seeking agricultural professionals...[while]...the number of graduates being supplied by Australian universities continues to decline significantly and is less than 20% of the number needed to satisfy the join market”*. This situation is all the more anomalous given the ready access to information about employment opportunities that graduates and potential students alike enjoy these days, including, most notably, websites of employing agencies, professional bodies and employers themselves that are often very appealing in design and easy to navigate.
- 7.3 To these puzzling circumstances must be added the observation that not a day passes without references in the media, in the professional press, and in a constant flood of published monographs, that the availability, access and affordability of food across the entire world is under ever-increasing threats from a wide spectrum of phenomena ranging from the impacts of climate change, urban creep, alternative uses for land, the diminishing availability and

⁴ Pratley, J and Copeland, L (2008) Graduate completions in agriculture and related degrees from Australian universities, 2001–2006. *Farm Policy Journal* Vol. 5 No. 3, 1-10

increasingly costly access to resources like water, oil and even labour, and global financial crises through to public concerns about pollution, bio-diversity, carbon emissions, animal welfare, land rights, and the use of nano-technologies and transgenics.

- 7.4 There has never been a more intellectually and morally demanding set of issues for agricultural professionals to address. So the question arises why aren't students enrolling in agricultural degree programs in their droves?
- 7.5 Rather than an increase in interest in and motivation for studying agriculture in the face of challenges, there has been a marked decline in those enrolling in, and thence graduating from agriculture degree programs. In the late 1980s, some 800 graduated from degrees or associate diplomas in agriculture. By 2001 this had declined to 500 and at the end of 2010 had fallen even further to 300.
- 7.6 There are those who argue that this situation is simply a failure of the institutions - along with employers of graduates and government policies - to reach out effectively to school leavers to attract them into agricultural studies that would eventually lead to satisfying careers in the sector: A conventional supply chain problem. As one commentator has recently observed "*it's not there are no exciting and rewarding careers in agriculture – it is that the emerging workforce generation does not perceive those opportunities in agriculture and is thus attracted to the more positive images portrayed in other employment settings*".
- 7.7 On this view, the solution to the problem would simply be to intervene at critical points in the supply chain – or 'flow-through system' – with specific strategies that are appropriate at those points, with a particular emphasis on addressing the efficiency and effectiveness of the feedback loops in the system. And this 'system' would be made even more effective and efficient if there were a central national body to co-ordinate and help integrate the activities – including marketing and other support – of those who 'supply' the graduates, those who 'demand' those graduates and those whose interventions can facilitate this supply/demand flow in one form or another.
- 7.8 The comprehensive data for first year entering student commencements at the University of Western Sydney from 1989 through to 2011 are illustrated in Attachment 5. They pertain to 'first year' enrolments rather than total enrolments or graduation numbers, as it was first year applications that was the presenting issue for this inquiry.
- 7.9 The figures for agriculture and related domains are expressed above the central line of the figure with those for horticulture below that line. Different course programs are illustrated by different colours.
- 7.10 The overall picture related to both agriculture and horticulture is a very significant decline in commencing students starting in the year 1998 in spite of very considerable efforts to attract students including school visits, open days and a novel residential program for high achieving students – ag camp – that had cohorts of between 80 and 120 students per event. The similarity in both major offerings is striking given that horticulture programmes and the agriculture programmes were offered by different academic units (save for a brief period in 1993) and with curricula that reflected two quite different paradigms.
- 7.11 The figure illustrates another important feature with respect to the diversity of course offerings offered in agriculture. This is best illustrated by the data for 1997. This shows seven different programs on offer reflecting attempts by the agricultural academics to adjust to

changing circumstances and to increase enrolments under circumstances of capped quotas. The picture is a dynamic one with introduced auxiliary courses such as agribusiness, equine studies and landscape management and conservation persisting for only 10 years or so and never achieving high enrolments. The relative consistency for the undergraduate degree in agriculture reflects imposed quota caps.

- 7.12 The associate diploma programmes which had been introduced in the early 1980's at the then Hawkesbury Agriculture College as 'in-house' articulation pathways, were phased out from the University of Western Sydney in 1998.
- 7.13 The data for first year enrolments into the animal science degree programme introduced in 2004 are also given. It might be assumed that there was a substitution factor at play here with students who might otherwise have studied agriculture opting to specialise in animal science. Anecdotal evidence however would suggest that this is not so with the students in animal science showing preferences for careers other than in agriculture.
- 7.14 The asterisks included on the dates at the top of the chart indicate years in which reviews were conducted on the entire academic unit and/or the course programmes. The picture that is revealed is of almost continual review or reform.
- 7.15 In summary then it is apparent that the decline in student enrolments in agriculture at the University of Western Sydney started as far back as 1997. While there have been many attempts of the intervening years to arrest this decline through such factors as increased recruitment efforts as well as changing curricula, little research has been conducted with respect to the decline in interest in the study of agriculture at the institution.
- 7.16 Included in this figure are the eight organisational changes that occurred between 1989 and 2012 with the transition of what was the Faculty of Agriculture and Rural Development with a total enrolment exceeding 500 students through to the School of Science and Health with enrolments not much more than 10% of that.
- 7.17 As the number of enrolments in agriculture declined, a spiral of involution followed: Fewer students meant fewer resources meant the need for fewer academics and support staff meant the decline of the quality of physical resources and so on. Retirements, redundancies and resignations saw the faculty numbers seriously depleted starting in the late 1990's.
- 7.18 It is important to recognise that Hawkesbury Agricultural College was unique among the agricultural colleges of the time in the manner of its transition from College of Advanced Education to University (See Attachment 6).
 - It was not in a truly rural location like so many of its counterparts in NSW or other States
 - It did not incorporate with a metropolitan university which already had agricultural faculties as the colleges in Victoria, Queensland or South Australia did or join with a regional university with such a faculty as Orange Agricultural College achieved with the University of New England.
 - It had not earlier been amalgamated with another larger College of Advanced Education or Institute of Technology – as had Wagga Wagga in NSW and Muresk in Western Australia respectively.

- 7.19 There were a number of significant disadvantages to Hawkesbury's strategy of amalgamating with two other local colleges of education to establish the University of Western Sydney: For the agriculture academics, there would be:
- no expansion in the undergraduate agriculture student body
 - no established university faculty to join or faculty numbers to amplify
 - no new research programs or facilities to enjoy
 - no new post graduate community to build upon
 - no expanded industry, sector or alumni networks to join
 - no new established university reputation to adopt.
- 7.20 This essentially meant that the agriculture academics at UWSH had to develop their own post-graduate programmes as well as to establish greatly enhanced research profiles with the significant disadvantage of slight experience in attracting funding for their work.
- 7.21 A significant proportion of the Hawkesbury academics were without higher degrees at the time of their incorporation into a university which would soon demand their involvement in research activity. And this was a situation that was exacerbated by the heavy demands placed on them by the experiential pedagogies that Hawkesbury had adopted more than a decade earlier. They would also face the very significant task of transforming the curricula to meet new university regulations.
- 7.22 A very significant price paid for this trend towards convention was the withdrawal from activities in rural communities and projects with agribusinesses and public service institutions by students and academics alike. It also meant a much reduced engagement with the national discourse on development.
- 7.23 These combined to greatly lower the 'presence' of the institution both in the 'bush' as well as in the 'industry'.

8 A brief overview of education in agriculture and related disciplines at the University since the establishment of the institution in 1989.

- 8.1 When Hawkesbury Agricultural College was incorporated as one of the three foundational colleges of advanced education of the University of Western Sydney in 1988, it had been in existence as an institution involved in post-school education in agriculture and related disciplines for only slightly less than 100 years.
- 8.2 Originally established in the colony of NSW to provide a scientific and technological education for farmers, it had changed its focus by the 1920's to educate those in the so called service industries. At that time it had introduced a three year diploma – the Hawkesbury Diploma in Agriculture (HDA), which represented a unique 'brand' qualification that persisted until the early 1970's at the time when the college became gazetted as a College of Advanced Education when the HDA was replaced by the Diploma of Applied Science - Dip.App.Sci(Agriculture).
- 8.3 There are those who argue that this was the first of a number of steps that eventually led to the virtual disappearance of the 'Hawkesbury Brand' altogether: The transition from

Hawkesbury Agricultural College to the University of Western Sydney Hawkesbury and thence to merely the Hawkesbury Campus of the University of Western Sydney seeming to evidence that claim.

- 8.4 Given the circumstances that prevail currently with respect to agriculture at UWS it is difficult to imagine how things had stood just a matter of two decades ago at the time of an earlier national inquiry to review higher education in agriculture and related domains – the so-called McColl Review⁵ which was released in 1991.
- 8.5 As recorded in the report of that McColl Review, the University of Western Sydney Hawkesbury (UWSH) as it then was, had the highest student load, at 826 EFTSU in agriculture and related domains, among all of the 30 institutions that were recognised as offering education in those domains at that time.
- 8.6 Neither this numerical data nor the accompanying narrative in that report however, indicated the full nature of the character of the Faculty of Agriculture and Rural Development at UWSH, its profile of activities or its reputation either at home or abroad as a centre of innovation in agricultural education, research or engagement encapsulated by the phrase the ‘Hawkesbury Approach’ that first appeared in the literature in the early 1980s when the institution was Hawkesbury Agricultural College (HAC).
 - 8.6.1 It offered the only experiential systems-based, problem oriented undergraduate degree and associate diplomas in agriculture, as well as action research masters degrees and PhD programmes in both agriculture and social ecology in Australia and was one of only two agricultural degrees offered in this country that included ‘sandwich’ semesters.
 - 8.6.2 It had developed a network of external collaborators that included more than 1200 farmers across NSW as well as in numerous other industry organisations and institutions and even with some rural communities and local governments.
 - 8.6.3 It was the only Faculty of Agriculture in Australia (and most places elsewhere too) that focused on the study of agriculture within a context of sustainable and systemic rural development.
 - 8.6.4 It was a genuine academic ‘school’ of some four dozen agricultural educators who had been on an intellectual journey together and collectively (and passionately) stood for something! They were clear in the niche that they occupied in a State that had seven other post-secondary institutions engaged in agricultural education.
 - 8.6.5 It had established strong linkages with the Land Care movement with which many of its graduates had found employment.
 - 8.6.6 It was a key partner in one of the first Co-operative Research Centres to be established in the country (CRC for Waste Management) and was the Australian centre for the Asian Program of Educational Innovation for Development (APEID) of UNESCO.
 - 8.6.7 It had just received a one million dollar endowment gift from the Vincent Fairfax Family Foundation (VFFF) to establish a Professorship at the University in an area - Farming

⁵ *Review of Agriculture and Related Education: A Report to the Department of Employment, Education and Training and the Department of Primary Industries and Energy.* McColl, J, Robson, A, and Chudleigh, J. February 1991.

Systems Research – which, at that time was the first research endeavour in that area in Australia.

- 8.6.8 It had hosted three international conferences over recent years: (a) the first conference in Australia on farming systems research, which was sponsored by the Australia Centre for International Agricultural Research (ACIAR), (b) the second world congress for experiential education, and (c) the first annual conference of the International Society for the Systems Sciences (ISSS) to be held in the southern hemisphere.
- 8.6.9 A number of academics from the Faculty had been directly involved, by invitation from the United States of America's Agency for International Development (USAID), in major evaluations of rural universities in India, Pakistan, Indonesia, the Philippines, Costa Rica, Jamaica, South Africa and Morocco.
- 8.6.10 Some had also been invited as key note speakers on the "Hawkesbury Approach"⁶ at national and international conferences and had consulted within this context to international development agencies including the Asian Development Bank (ADB), the Food and Agriculture Organisation of the United Nations (FAO) and development-focused Foundations that included Ford, Kellogg and Winrock, in addition to USAID.
- 8.6.11 Finally, academics in agriculture and social ecology had been very strong supporters of the long-standing and, by 1991, successful strategies launched two decades earlier, that were aimed at transforming the institution (then HAC as a CAE) into a comprehensive university-like organisation with academics from many different disciplines designing and presenting programs of study (and research) that encouraged and allowed the integration of studies in the bio-physical sciences together with the socio-cultural sciences and the humanities.
- 8.7 A very significant shift had also occurred in the role that the Faculty of Agriculture and Rural Development adopted within the rural sector of NSW from being a rather passive centre essentially dedicated to formal education with very limited research or engagement activity to becoming a very active participant in the national discourse related to the sustainable development of agriculture and its associated rural communities and biophysical environments.
- 8.8 Today, the University of Western Sydney at Hawkesbury finds itself in some ways in no man's land. The choices for students studying agriculture are now essentially between metropolitan universities with all that they offer in terms of 'culture' and their location in cities where students can gain employment as they earn while they learn. On the other hand rural universities such as UNE and CSU offer access to rural conditions including different farms, rural communities and biophysical environments that include water catchments and forests as well as a wide variety of different farming enterprises from intensive feed lot cattle to broad acre cotton, grains etc. typically within 100km radius
- 8.9 The Hawkesbury campus is neither metropolitan nor rural. Whilst its peri-urban location is unique amongst those institutions that provide agricultural education, peri-urban agriculture/horticulture is unlikely to present anything other than a marginal interest to agricultural educators, marketers or policy makers alike.

⁶ In 2005, a special edition of the International Journal of Systems Research and Behavioural Science was dedicated to the Hawkesbury Approach as its 25 year anniversary was celebrated.

8.10 Lessons Learned:

- Both government and internal institutional policies and strategies can have profound impacts on the best laid plans of small academic units, and institutional flexibility is fundamental for resilience.
- Integration of agriculture with horticulture with food with the environment with commerce with hospitality with social ecology all prove very difficult in practice, for both academic and organisational reasons.
- Both academic and administrative leadership is essential to generate and sustain innovations.
- Farms present a special challenge with respect to their necessity or otherwise for agricultural education (there were as many people working on the farm including demonstrators in 1978 as there were academic faculty).
- Pedagogical innovations are exceptionally difficult to maintain in the face of convention. The same is equally true for paradigmatic challenges.
- Going it alone as an institution is fraught with difficulties as far as innovations in education for agriculture and related endeavours are concerned.

9 **A context for the decision not to have an intake into the Agriculture program in 2012.**

- 9.1 Given the logical and responsible policy of the university to seek to ensure that all of its courses – and the academic units that present them - are financially viable, it is not at all difficult to understand the decision not to mount a program with less than a dozen first year students (at most) into a course that had been characterised by low enrolments for a significant number of years.
- 9.2 There was the considerable risk that students would not actually wish to enrol in a course with such low numbers as a first year cohort, or that even if they did, they would continue to stay enrolled in the subsequent years.
- 9.3 Through its involvement as a member of the Australian Council of Deans of Agriculture (ACDA) the university was well aware of the increasingly drastic status of tertiary agricultural education nationwide. It was also conscious of the fact that two national inquiries into education into agriculture and related domains had recently been conducted, with another also underway at that time, being conducted for the Commonwealth Senate.
- 9.4 Finally it was also known that the university had been successful in its application for nearly one million dollars from the Structural Adjustment Fund to explore possible developments in education and research in agriculture in co-operation with both the University of Sydney and the NSW Department of Primary Industry.
- 9.5 With all of these factors in mind, and anticipating significant reaction to its decisions, the university decided that it was better to mount an investigation into what might be done to transform the presenting circumstances in concert with others involved in agricultural education and research than to proceed to 'limp along' with untenably low numbers of students enrolled in the new course that had been introduced in 2012 to which there had

been such little interest displayed by potential students. Cross subsidies that had helped to support the endeavours had first come under strict scrutiny in a 1996 review of the (then) School of Agriculture within the Faculty of Science, Technology and Agriculture and a number of adjustments to programmes and other activities had followed over subsequent years (as had further reviews!).

- 9.6 This unpalatable and unsustainable situation had become even more apparent from 2006 onwards with the replacement of the previous School of Environment and Agriculture by a new School of Natural Sciences within the College of Health and Science.
- 9.7 The situation obviously did not improve substantially from 1996 in spite of a number of attempts to transform it in accordance with the recommendations from three external reviews of the situation (2003, 2004, and 2005) and actually implementing some of the recommendations including establishing the 'supply-chain' focused degree program (which, however, only ran for two years) while the recommendation for a new degree in agri-business, developed in consultation with a wide range of stakeholders, was not adopted by the university.
- 9.8 In addition to these external reviews, at least half a dozen internal reviews were conducted into curriculum and structural reforms often under the purview of an advisory committee that included external members, starting in 1993 and with the latest just last year, in 2011, when the new degree in Sustainable Agriculture and Food Security introduced in the current year, was designed within the rubric of the Bachelor of Natural Science and based on many of its pre-existing and common units.
- 9.9 The decision not to admit a first year intake into the agriculture degree was taken with cognisance of the possible implications for existing academics at UWS who are currently still involved in agricultural education at UWS, as well as appreciation of the situation with regard to the extensive land holdings which are currently gazetted by the NSW government for educational purposes.
- 9.10 The more significant issue as far as this inquiry was concerned was what the university might do to improve the situation.
- 9.11 Accordingly, it made sense to turn the attention of the inquiry also inwards by posing two critical questions to those responsible for decisions relating to the further strategic directions of the university.
 - Why is the situation with respect to agriculture students a matter of concern for the University?
 - What would the institution gain by resuscitating an academic domain that appears to be moribund?
- 9.12 Agricultural students after all, currently represent only a very small proportion of the total student body of UWS, and have done so for a considerable time. Even on the Hawkesbury campus - the historic home of agricultural education in NSW - students studying for a degree in that discipline constitute considerably less than 5% of a student population which itself comprises only 6% of the UWS total undergraduate enrolment.
- 9.13 Furthermore, resignations, retirements and redundancies, have left but a vestige of the former corps of academics in that domain, while the quality of some of the teaching facilities

has inevitably declined – most notably the once extremely diverse and comprehensive farming enterprises on the 1300 hectare estate on which the campus is located.

- 9.14 By their very nature, tertiary programmes in agriculture and related disciplines are expensive to present and those offered at the Hawkesbury Campus of the University over many years have proved to be no exception. The multidisciplinary nature of this field of study dictates the need for a higher number of subject experts than more specialised courses.
- 9.15 Agricultural education needs the support of academics from many different disciplines not just from the ‘natural’ sciences but also from the social sciences and the humanities. Such a wide spectrum of disciplines has been absent on the Hawkesbury campus of UWS essentially from the time of the translocation of many academics to the Blacktown (Nirimba) campus beginning in 1995.
- 9.16 Seven key rationales could be generated from the responses to the first of the two questions above:
- There are still significant numbers of academics available at UWS to present undergraduate as well as graduate programs in agriculture and related areas of study, the laboratories and other teaching areas have recently been upgraded and new strategies have been adopted to rejuvenate the farms following an external review⁷.
 - The University of Western Sydney, through its ‘Hawkesbury connection’, has a long history of, and enviable reputation for both undergraduate and graduate education, for research in agriculture, horticulture and food, and for engagement with related industries and professional organizations that is worthy of protection. It also has a very large, if currently under-engaged and essentially disconnected alumni population.
 - Even while an essential, and laudable focus of UWS lies with its emphasis on engagement with the Greater Western Sydney region, the institution remains a locus for potential students from anywhere – including overseas. There is no reason why it could not also present a locus for the study of agriculture and related endeavours for potential students from the region itself who are part of a demography that might previously have never considered agriculture as an intellectually stimulating field of study that can lead to exciting and rewarding careers through a wide variety of pathways including both commerce and research and development.
 - A generous gift from the Vincent Fairfax Family Foundation more than twenty years ago allowed the establishment of an endowed Research Professorial Chair in what is now called Sustainable Agriculture and Rural Development. This prestigious research position has been held since 2009, with distinction by Professor Bill Bellotti and this provides a very significant signal that UWS has not abandoned agriculture by any manner of means.
 - Professor Bellotti’s research and development work have recently attracted further substantial financial support from that Foundation. This latter support has included

⁷ *Review of the Hawkesbury Farm and Commercial Usage*, GHD Consulting, April 2012. It contains a number of key recommendations to improve the economic performance of farming enterprises which have been neglected for a number of years while neglecting to pursue the situation with regard to the university’s tenure of the land. .

funds to enable the university to engage with the activities of the Primary Industry Centre for Science Education (PICSE) which is committed to increasing awareness of the scientific foundations of primary industry in schools. Prof Bellotti and his research associates have also been successful in acquiring grants from other sources to support their burgeoning research and development agendas.

- Professor Bellotti is the default leader of what remains of the agricultural group at the University of Western Sydney.
- With its long record of innovations in educational and research approaches to agriculture and rural development, and its creative contributions to the national discourse with respect to sustainability and to the development of a systems paradigm for approaching issues in agriculture, the University of Western Sydney can be seen to have a moral obligation to continue to contribute actively in all of these domains.
- The university has given a public commitment to “*continuing to explore the possible innovation of course offerings in agriculture disciplines and opportunities to address the historical decline in demand for agricultural education*”.

9.17 The matter of what the university might gain by resuscitating agriculture proved to be much more difficult to assess save by an overall belief that as there can be no doubt that agricultural production to ensure the security of food for the Australian public as well as to contribute to export revenue will continue to assure the importance of agriculture in this country, it remains a potentially rich vein for student enrolments.

9.18 From this perspective it's essentially a matter of developing programs of study and of research that will attract new students, new academics, and new sources of funding alike.

10 Key issues impacting on current and future agricultural education programs at UWS as well as at other institutions at home and abroad.

10.1 There is a wealth of literature that highlights the key issues that currently impact upon agriculture and its development and an ever-increasing amount of attention is being given to speculation about issues that might plausibly be emergent as the future unfolds in its predictably unpredictable, uncertain and often turbulent manner.

10.2 Almost without exception, these issues have (and will have) profound consequences for the character of agricultural education as well as research.

10.3 There are also a host of issues that are impacting (and will continue to impact) upon education itself as well as on the institutions that are, and will be involved in the future, in agricultural education.

10.4 It is these challenges *in toto* that demand very considered investigation by those, including the University of Western Sydney, who are committed to responsible responses to them. Addressing them dictates a commitment to learning to develop foresight as well as learning from hindsight: It denotes the significance of 'learning from the future' using such techniques as scenario planning, as well as from the present and the past.

10.5 In contrast to countries including the USA, Britain and France, those in Australian institutions concerned with agriculture and with its education, have, with but very rare exceptions, shown

little propensity to approach the matters from such a 'future-oriented' and systemic perspective. Hawkesbury Agricultural College was one such exception back in the 1980s and early 1990s, while the CSIRO is among contemporary institutions that are assuming such a perspective with some of its initiatives.

10.6 Current issues facing agriculture itself are certainly complex, systemic and dynamic enough to present agricultural educators with very difficult decisions: Following a scenario planning technique of differentiating between six major categories of 'environmental influences' on systems embedded within them, it might be stated that agricultural/agri-food systems are currently facing critical 'environmental' influences that include among others:

- *Natural*: changing climate and weather patterns associated with anthropogenic activity that significantly includes farming; resource shortages including land, labour, capital, water and energy; the loss of ecological integrity; animal-borne human disease pandemics; droughts, floods, fires and plagues; loss of ecological integrity.
- *Social*: ever-increasing human population and changing demographic profiles; emerging famines; refugee migrations; rates of employment; career aspirations and opportunities; resource-based tensions; law and order; social networking; media; standards and traceability.
- *Political*: geopolitical changes; government policies for education, agriculture, food, the environment, taxation; foreign investment.
- *Economic*: globalisation; super-marketisation; financial instabilities; taxation; subsidisation; terms of trade; revenues and costs; vertically integrated supply-chains; corporatisation; productivity.
- *Cultural*: changing diets; worldview assumptions about science and knowing; changing values; attitudes to land ownership, animal rights, food safety and security, the environment, and capitalism.
- *Technological*: GM; transgenics; informatics and communication technologies; robotics; nano-technology; synthetic foods; alternative energy sources

10.7 The systemic inter-relatedness among these different environmental 'domains of influence' with each other and their impacts upon agri-food systems that are embedded within them is complex, dynamic, often turbulent and unpredictable. The developments and management of systems under these circumstances demand an extensive profile of competencies (Attachment 8) that are significantly removed from those which conventional agricultural programmes offer.

10.8 And these new challenges must be addressed within circumstances where there is no shortage of current challenges facing agricultural educators as they struggle to increase interest from potential students to enrol in agriculture and its related areas, as clearly evidenced throughout this inquiry through conversations, the research and technical literature, through inquiry reports, and often in the popular media.

- Prevailing (and sometimes clearly justified) negative image of farming and agriculture in general, including environmental damage, resource conflicts, market corruption, animal cruelty, and pollution.

- Poor levels of agricultural and food literacy in primary and secondary schools and declining emphasis on agriculture and food in the curricula.
- Low regard for agriculture as a school subject and the associated factor of often low academically achieving students studying it.
- Education level amongst farmers and others in rural areas is lower than the general population and this tends to reinforce the notion that a career in agriculture does not necessitate an academic qualification.
- Agriculture remains a very conservative domain where innovations, including those in agricultural education are often viewed with considerable suspicion and prejudice.
- Lack of understanding and/or attraction of career pathways in agriculture and confusion about distinction between farming and non-farming occupations within the industry. A simple differentiation can be made between:
 - Those directly related to farm production – farmers, farm managers, supervisors, technical assistants etc.
 - Those that involve technical, managerial, financial or counselling services directly to farmers – extension agents, farm consultants, rural counsellors, financial advisors, agribusiness representatives etc.
 - Those that provide services to farmers and others in rural communities without any direct engagement with them – researchers, educators, economists, policy makers etc.

While the boundaries are somewhat blurred in practice, these three domains have characteristically been serviced by the three different levels of providers.

- Confusion about distinctions between agribusiness and agriculture also abounds
- Lack of a coherent professional identity – no single professional body, no standard certification, no circumscribed clientele, no clearly identifiable profile of competencies or practices, no organised professional development programs.
- Career advice at high schools often focuses more on educational choices than on career destinations.
- Confusion over different types/levels of education within agriculture – technical, vocational/practical, professional/scientific – as well as the different nomenclatures of qualifications – BSc(Agriculture), B.Agriculture, B.Rural Science, B.Agricultural Science, B.Agricultural Economics, B.Farm Management, B.Ecological Agriculture, B.Natural Science (Agriculture), B.Systems Agriculture – and the length of study – three year, four year and five year (Bologna Model) full time or extension of those times when the courses are offered externally or through part-time study.
- Lack of clear pathways for articulation between one ‘level’ of education and others.
- Few scholarships or cadetships available for students of agriculture.

10.9 In the face of these challenges there have been recurring ‘calls for action’ which have included the need to increase:

- Awareness among school students of agriculture as both an interesting area of study at university and a satisfying option for a life-long career in production, in scientific research, in technology development and/or business management all related to agriculture and related areas of human endeavour including food and the environment.
- Co-ordination between the different (and invariably fragmented) education providers, professional and industry bodies, government agencies, policy makers, and employer groups, and other 'stakeholder groups' with an interest in or concern for agricultural education.
- Collaboration between providers and industry representatives to improve the relevance of the courses of study to the competencies sought by employers.
- Co-operation among, and opportunities for, articulation between different educational institutions across all of the different levels from primary schools through to universities.
- Rationalisation of research agendas among different providers as well as of their course offerings.
- Provision of financial incentives for students who wish to study agriculture and fiscal subsidies to academic units concerned with agricultural education by governments, employers and the educational institutions themselves, and
- The establishment of a single 'peak body' such as the suggested Agricultural Education Council, to provide coordination of all of these dimensions.

11 Ideas and proposals that might be considered as the University works towards an agenda for new approaches to agricultural education at this institution.

- 11.1 The following items have been extracted from notes and recordings taken during the conversations with stakeholders as well as from published material. They are presented in no particular order with clear contradictions being apparent between a number of them.
- Consider 'abandoning' the word *agriculture* altogether in relation to university studies – not only from course offerings and academic organisational units of institutions but also from the national 'narrative' - and focussing instead on more generic phrases such as natural resource or land management or agribusiness management, or on more 'attractive' words such as food.
 - In contrast, The University of Western Sydney should restore the word more explicitly in its degrees and in the academic units that offer them.
 - Liaise closely with those who are exploring actions to follow the recommendations that have been flowing from the recent flurry of activity related to agricultural education. This would benefit the university through increased exposure to potential students, increased linkages with other major stakeholder organisations, and signal the commitment that the University of Western Sydney has to agricultural education.
 - Take the opportunity of the 25th anniversary of the University of Western Sydney to introduce a new course in agriculture/horticulture with aggressive marketing approaches.

- Be much more aggressive in marketing the agriculture courses, visit rural schools especially, and restore Ag-camp and Open Day while continuing to support innovations such as the UniSteers Challenge that has been operating since 2001.
- Use social media much more effectively to engage with other stakeholders as well as potential students through Facebook, Twitter, Blogs.
- Markedly strengthen the extensive network of past agricultural and horticultural graduates from all eras including the old Hawkesbury Agricultural College, HAC as a college of advanced education, Hawkesbury as a member of the federated University of Western Sydney, the Hawkesbury campus of the non-federated UWS.
- Once created, such a network could play vital roles in marketing agricultural courses at the University of Western Sydney through school visits, brochure distribution, attendance at field days and other opportunities. It could also play other supportive roles.
- Re-establish the 'Hawkesbury brand' within the University of Western Sydney as might be expressed in
 - A strong focus on the social living/learning community
 - An new identifiable 'niche' within agricultural education, and indeed agriculture itself
 - An innovative approach to course curricula and ways of delivery (pedagogy)
 - A renewed passion for innovation, and
 - The re-institution of the Hawkesbury 'label'.
- Re-develop a Hawkesbury Agricultural College within the university with an emphasis on vocational education for farmers and those who work directly with them as advisors, consultants etc.
- Do all that can be done to improve articulation opportunities for students from VET/TAFE institutions including Tocal College and the Western Sydney Institute and to attract 'transfer' students from other courses and/or institutions.
- Re-invigorate the farms and use them to illustrate 'best practice'.
- Re-introduce short courses, field days and open days to illustrate the nature of agriculture to prospective students as well as farmers in the district.
- Work with the Hawkesbury Harvest network and with other local farmers to create local learning sites for students.
- Dedicate one hall of residence to create a residential living/learning environment for students of sustainable agriculture with access to land and other production resources for their exclusive use.
- Seek to copy the highly successful Harper Adams College in the UK (which has in excess of 4000 students studying agriculture and related domains) as a University College within the University of Western Sydney committed to research and teaching in agriculture and related domains and to engagement with rural communities, organisations and institutions and Governments.

- Re-introduce associate diplomas to provide a potential ‘in-house’ articulation for vocational undergraduate education with a focus on practical husbandries and management which would involve students in activities and projects on the farms of the Hawkesbury campus estate.
- Introduce a four year degree which has an identifiable theme such as Rural Science at the University of New England, Agronomy at the University of Sydney, or indeed Systems Agriculture as it was at Hawkesbury Agricultural College.
- Re-visit the notion of land and its management as an integrating theme for undergraduate programs.
- Include a ‘sandwich’ component of one or two semesters within a four year program for students of food/agriculture/horticulture.
- Abolish the phrase Natural Science but retain the notion of a family of courses that comprise general units with specialist ‘majors’.
- Replace Natural Science with a title that embraces agriculture, animal science, horticulture, food, health and the environment and that extends beyond the ‘natural sciences’.
- Re-establish a corps of academics consisting of social scientists and those from the humanities as well as from the bio-physical sciences and create a named academic unit – school department or even just group.
- Appoint a new professor to provide leadership to shape what, in essence, would be a whole new ‘systems approach’ to education.
- Consult with industry to design curricula appropriate to the immediate needs of employers and encourage much greater interaction between academics and those in industry.
- Engage more actively with other major institutions and organisations concerned with agricultural education and/or the development of agriculture itself with a particular focus on exploring different scenarios for the future as a framework for strategic decisions as both the French and British have done.
- Build more collaborative relationships with other educational institutions in the State – universities, VET/TAFE institutions and other providers.
- Join with the three other universities that offer education in agriculture and related domains in NSW, to form a State institution equivalent to an American Land Grant University but with each institution assuming a different focus on development and offering different ‘majors’.
- Students could spend different semesters on different university campuses.
- Focus on organic agriculture or agro- ecology as a niche specialisation and work closely with regional communities and local governments within the context and spirit of ‘transition towns’.
- Exploit the unique peri-urban location of the Hawkesbury campus along with its land and water resources as a focus for research and education in production.

- Explore with leaders in the industry, how the University of Western Sydney might develop novel approaches to education specifically for agribusiness with a particular emphasis on ‘paddock to plate’ or supply chain innovation.
- Work closely with the Primary Industries Educational Foundation and the Primary Industries Centre for Science Education to support research into the motivation of students in secondary schools (or perhaps even primary schools) to pursue particular career paths, seek particular jobs or seek to pursue tertiary education.
- Collaborate with research scientists at the Hawkesbury Institute for the Environment, the Solar Energy Technologies Group and the Department of Primary Industry all on the Hawkesbury campus to develop and teach curricula focused on ‘high science’ and technology related to the traditional scientific disciplines of soil, plants and animals.
- Establish the Hawkesbury campus of the University as an integrated Institute for Sustainability or Sustainable Development or Sustainable Wellbeing as envisaged in the master plan for the campus. Appoint a very senior academic to head up such an enterprise which would see the integration of a host of different research and educational initiatives.
- Get out and about much more and just participate in the ongoing national discussions of agriculture, food, rural communities.
- Cut the losses and withdraw from agricultural education altogether to concentrate on endeavours more appropriate to the further development of Greater Western Sydney.

12 Options for potential future programs at UWS.

- 12.1 Of all the lessons that can be learned by an analysis of what has happened at the University of Western Sydney in regards to agricultural education the three most significant relate to three categories of identity – culture, programs and themes. The prevailing cultural, programmatic and thematic identities that are associated with the Hawkesbury campus of the University of Western Sydney in 2012 are far removed from those that prevailed at the time when HAC/CAE was incorporated into the University of Western Sydney as one of its three foundation Members.
- 12.2 The consideration of any options for the future for education in agriculture or related disciplines faces challenges in all three of these dimensions. This is perhaps no more apparent than reflection on the centennial celebrations of Hawkesbury that were conducted in 1991. In spite of the damaging potential impacts of the McColl Report that was released that year the Hawkesbury Faculty of Agriculture and Rural Development had much to celebrate beyond its sheer resilience in the face of often daunting challenges.
- 12.3 The nation was getting used to living in a free market economy and whilst the abolition of tertiary education support and its replacement by the HECS, seem to have minimal impact. On the other side of the coin however, and of vital significance to agriculturalists of all flavour,

was the collapse of the wool industry: one of the most significant of all agricultural industries through the history of Australia to that point.

- 12.4 The most depressing issue here was that most agricultural scientists and agricultural economists could have foreseen this event. In spite of there being some outspoken critics of the schemes that led eventually to the collapse of the industry, their comments were ignored. Furthermore there were scientists and economists alike 'in the opposite camp'. In retrospect it is not at all difficult to see that the power and logic of science and economics, and indeed of educated people, could be distorted by what was essentially a handful of powerful individuals within the industry and the parliament of the day.
- 12.5 Any options that are considered including any of those outlined below need to recognise that whatever developments may be contemplated will involve very considerable investments.
- 12.6 They also dictate the need for strong academic leadership which will differ somewhat in each case.
- 12.7 The five options that are explored in this Section of the report are neither exhaustive of the possibilities nor are they mutually exclusive of each other. It would be possible for one or two of the variants to co-exist, and indeed together they could be construed as a phase transition from the relatively straightforward to the most comprehensive and complex which could be pursued over time.
- 12.8 It should also be emphasised at this point that what follows is not a prioritised list of recommendations presented by an 'expert' after consideration of a host of fact and opinions gathered through extensive research and consultations. Rather the five options are presented as potential scenarios intended to inform a multi-stakeholder discourse with respect to decisions about where the University of Western Sydney 'could/should go next' with regard to education and research in agriculture and related disciplines.

Option One

The Present Augmented

- 12.9 The first most obvious option, of course, is to focus intensively on promoting the 3 year undergraduate degree course already on the books: B.Nat.Sc (Sustainable Agriculture and Food Security).
- 12.10 There are important implications here for the loss of momentum and a further dilution of any reputation that the University of Western Sydney and its Hawkesbury campus in particular, might have held. However, this does provide the university with an opportunity to re-cast its degree offering for introduction in 2014 with a significant lead time for publicity. It would be very important to assure that as much publicity as possible be given to the initiative to emphasise the fact that the University of Western Sydney has not withdrawn from agricultural education but has taken the next steps towards its reconstitution.
- 12.11 The establishment of a strong alumni network would be of immeasurable assistance in this regard.
- 12.12 Advantage should certainly be taken of the momentum associated with the Allen Group Report, the Senate Inquiry Report and the commitments of bodies such as the Australian Council of Deans of Agriculture, the Royal Agricultural Society, the Australian Institute of Agricultural Science and Technology, the Farm Management Institute and the Australian Year of the Farmer. In some manner or another, the word 'Hawkesbury' as well as the phrase University of Western Sydney would need to appear in any of these activities: It is the very loss of this identity in the public domain of 'Hawkesbury' and the connection between the Hawkesbury campus and the University of Western Sydney that has been the single most recurrent issue raised during the stakeholder consultations.

12.13 In this regard it is interesting to record the following observation included in the Senate Inquiry Report issued just 24 hours prior to the submission of the draft report overview:

“The decline of the old pillars of agricultural education in Australia such the Muresk Institute in Western Australia, the Hawkesbury Agricultural College in New South Wales – among others – are a sad indication of the health of the sector. Shortly after the commencement of this inquiry it was announced that agricultural enrolments at the Hawkesbury Agricultural College would be suspended due to a lack of student interest. The demise of one of the oldest and most prestigious agricultural colleges is a siren song that should not be ignored.”

12.14 Hawkesbury Agricultural College was of course disestablished in 1989!

12.15 Another consistent factor that emerged during the consultation process in both personal conversations and in written reports was the significance of the loss or at least the diminution of the words ‘Hawkesbury’ and ‘agriculture’ in the university’s documentation. Under these circumstances it is not at all surprising that many believe that the University of Western Sydney no longer offers agriculture as a course of study nor indeed is involved in the domain in any manner. The adoption of the term Natural Science as the generic title of the qualification and of the School of Science and Health as the ‘academic home’ of the agricultural course, further obfuscate the issue.

12.16 Consideration therefore should be given to re-badging any future qualification in agriculture to recapture the word itself so signalling a return to the field, as it were. Natural Science is anything but an unambiguous term and given that the name of the school is no longer Natural Science, it would seem opportune to change the nomenclature back to something that is much more recognisable by potential students and those who might influence their decisions.

12.17 Research indicates the significance to high school students of educational choices over career destinations and while research on the topic has not been conducted, the term natural science would probably not rank highly as an academic domain with either prestige (compared to science itself) or comprehensibility (compared to applied sciences for instance or agricultural science itself).

12.18 Strong arguments can be mounted in favour of presenting agriculture (sustainable or otherwise) as one of a number of majors within a cluster that could include Animal Science, Horticulture, Nutrition and Food, and Agriculture.

12.19 As with other options below there would be very clear advantages of exploiting opportunities for articulation with VET/TAFE institutions such as Tocal Agricultural College and the Western Sydney Institute of TAFE particularly its Richmond Campus.

Option Two

The Past Re-cast

12.20 The second option might be seen as an attempt to regain opportunities that were lost.

12.21 The extraordinary growth and diversification of UWSH over the first six years of its existence on the single campus presented an opportunity that, for a variety of reasons was not grasped at the time and was indeed subsequently lost. With strategic intent the executive of the Hawkesbury Agricultural College of advanced education had deliberately expanded and diversified its academic domains beyond its traditional emphasis on agriculture, horticulture and food technology and science to embrace land economics and business studies, environmental science and management, hospitality and tourism, nursing, social ecology and the humanities.

12.22 There were even attempts to retrofit a conceptual theme that expressed some association or another with *land*. This latter idea gained little purchase and indeed no attempt to achieve significant integration of the different domains achieved success. The translocation of a number of the key programmes to the Nirimba campus at Blacktown in the mid 1990’s added

further fracture lines to what might otherwise have been a wonderfully integrated academic endeavour characterised by coordinated research agendas and multi-streamed undergraduate programmes.

- 12.23 The second option then is to re-explore those opportunities but cast them in the current context. In a number of very significant ways this represents the essential logic of the course that was developed by the agricultural group in 2011 under the rubric of sustainable agriculture and food security. Indeed this option could be interpreted as merely an expansion of Option One.
- 12.24 However, in contrast to the situation presented in that option, students would enrol in a generic programme of studies that extended significantly beyond the 'natural' or biophysical sciences to also include some social sciences and aspects of the humanities. This of course is a long established practice with many universities around the world that adopt the idea of 'majors' as specialised options of study following preliminary years either of liberal studies or studies of the basic sciences.
- 12.25 Both the Universities of Melbourne and of Western Australia have recently adopted a model similar to this and based on what is referred to as the Bologna system. In essence this entails five years of university study that concludes with a Masters degree in the major specialisation.
- 12.26 In the option proposed here, during the first two years – or even three if the full five year Bologna model was adopted – the students would be exposed to foundational studies that emphasised connections between agriculture, horticulture, food, health and the environment, perhaps from a theme of 'inclusive well-being'. The selection of the name of this generic position is one that would demand considerable thought in the light of the empirical evidence that suggests the significance of familiarity with the field of study as a factor influencing the choice of courses by school leavers.
- 12.27 It would be very similar to the conventional four year programmes long offered by public universities in the United States but without the enormous advantages that those universities have with regard to their networks of connection across the entire State in which they are located.
- 12.28 The challenge is not to be understated: For all of their long developmental history together on the Hawkesbury campus agriculture, horticulture and food essentially failed to integrate themselves into a coherent theme or offer any significantly integrated programmes of study. This omission was further amplified with developments in Environmental Science, Business, Health and Social Ecology.
- 12.29 Whilst the social sciences and the humanities as well as the natural sciences had all grown over that period, little attempt was made to exploit their potential incorporation into an explicit theme. It was not as if this possibility wasn't raised for indeed it was an important discourse on the campus. Perhaps it was a combination of the rate of acceleration of everything, the budgetary concerns, and the migration of virtually half the student population to the Blacktown Campus that obscured the significance of the development of a whole new thematic identity for the campus.
- 12.30 In any event the momentum was lost and essentially the grounds for the eventual decline of virtually all of these individual initiatives, with the exception of nursing, were laid.
- 12.31 Sufficient remnants of those times exist in the memories of some of the academic corps that remains on the Hawkesbury campus. There are also others who, without the privilege of such past experience could certainly contribute significantly to the whole new endeavour as the 'past re-cast'.
- 12.32 The image here, as in Option One, is of a set of specialisations that are presented to students as majors following a significant core of learning experiences common to all.

- 12.33 Of great significance in this context is the development of a pervasive discourse amongst the academics who would need to be involved. One of the most important aspects of the development and management of the degree programmes in Systems Agriculture at Hawkesbury over the fifteen years or so of their development was the time that was allocated to allow faculty to meet in forums face to face. In hindsight of course there were costs as well as benefits of this strategy. The benefits were undoubted as faculty together learned a host of theories, concepts and practices that were almost totally unfamiliar to them at the start. The substantial dis-benefit however came with the need for faculty to allocate effort and time that essentially came as an opportunity cost to concentration on their careers as researchers.
- 12.34 One of the great challenges for faculty in colleges of advanced education when they became incorporated into universities was the need to invest more time in pursuing activities as researchers - from gaining grants to support such work and publishing its results.
- 12.35 The systems agriculture paradigm that was shared in large part with social ecology was extremely demanding of academics and presented a very significant dilemma to those seeking to advance their careers as university academics: So one of the implications of shifting to Option Two is the resolution of this dilemma.
- 12.36 There are some supreme examples of the success of the key notions presented in this option at a number of universities overseas. Two particular examples can be given: Harper Adams University College in rural England is an outstanding example of a standalone institution that has built an international reputation for the quality of its education and of its research and engagement. It has adopted a truly tripartite mission of teaching, research and community engagement and has more than 2500 undergraduate and 2600 postgraduate students. Undergraduate programmes are offered in the following areas: Agriculture, Animal Studies, Business, Countryside and Environment, Engineering, Food Studies, Rural Estate, Property and Land Management, Veterinary Nursing and an Extended Foundation Degree Programme enrolled in a family of four year degree programmes with one of the years being dedicated to a sandwich period in industry.
- 12.37 The degree programmes offered are all under the rubric of BSc (Hons). They include among others: Agriculture, Agriculture with Animal Science, Agriculture with Crop Management, Agriculture with Environment Management, Agriculture with Marketing, and Agriculture with Farm Business Management. Reflecting back, UWSH was in a position to have offered all of these programmes! Michigan State University is at the other extreme in that it has a College of Agriculture and Natural Resources within a very large, comprehensive single campus university.
- 12.38 So one model for option one would be the restitution of the Hawkesbury Campus as an identifiable entity within the University of Western Sydney. If the Harper Adams example were followed this would mean a university college.
- 12.39 A matter of considerable significance here is the recognition that the graduates of tomorrow and beyond will live and work in an ever increasingly digitised world. 'Virtual learning' will thus be a very important aspect of education here.
- 12.40 Another issue of outstanding importance is to extend the essential messages of the multidisciplinary theme of this option back into secondary schools and the need to develop clear pathways of articulation between the university and institutions in the VET/TAFE sectors. Particular consideration should be given to collaboration with the Western Institute of TAFE and in particular Tocal Agricultural College at Patterson in the Hunter Valley. This latter institution is an outstanding example of attention to education for those who work directly as primary producers as well as those who work directly with them. It is interesting to note that a number of UWSH graduates are member of the faculty there.

- 12.41 The national curriculum for school education is of course currently under construction and this would be a prime moment to attempt to affect change to enable this vision of longitudinal studies to be realised. One of the major deficiencies of agricultural education over the past century and a quarter has been the singular lack of coordination from schools through to universities via the VET sector. One of the other phases of course as has been emphasised throughout this report has been the lack of collaboration between areas of study like agriculture and food and between different academic domains like the natural sciences and the humanities. So no attempt is made here to minimise the intellectual as well as the pragmatic challenges.
- 12.42 Relationships with other institutions such as State and Federal Departments of Primary Industry or Agriculture and Food as the case may be, as well as with CSIRO be firmly established.
- 12.43 There is however for all five of the options presented here, an imperative to innovate and indeed the programmes of study need to cultivate creativity and innovation through the pedagogies adopted.
- 12.44 To look back from the future one could imagine in twenty years' time, UWS sponsoring a recognised entity within it, that has a thematic identity as well as a programmatic one. For the sake of convenience it might be called the Hawkesbury College or University College within the University of Western Sydney.
- 12.45 Leadership will be vital – as indeed it will in all of the options being presented here, but again licence must be afforded to anyone appointed to academic leadership positions to pursue goals that are currently not rewarded as significant academic achievements so there will be a call for procedural and institutional innovations.

Option Three

The High-Tech Future

- 12.46 There can be no doubt whatsoever that those who will manage natural resources in the future will face challenges the like of which have never been seen before. There will be influences from natural, social, political, economic, cultural and technological sources alone as well as in almost every conceivable combination and permutation. Science-based technologies have long been the basis for improvements in productivity in agriculture as with medicine. The range of these innovations extends from applications to improve the fertility of soils and the efficient use of water, through to the control of plant and animal diseases, the design of controlled environments, through nutrition and applied genetic breeding of both crops and livestock, and the development and application of informatics, robotics, nanotechnology and rDNA technologies.
- 12.47 This third option then pursues quite a different line of logic from the previous two. The approach here would be to introduce agriculture as one major within a degree in advanced science and technology.
- 12.48 While the Hawkesbury campus has little experience traditionally in what might be referred to as science-based high technological research or development there are certainly those across the whole of the university who have exemplary records in such activities. The establishment of the Hawkesbury Institute for the Environment and the Solar Energy Technologies Group on the Hawkesbury campus already represent a potential source of researchers and academics to support the establishment of undergraduate studies in advanced science and technology as it relates to the developments of high tech agriculture, horticulture and the environment.

- 12.49 Scientists at other locations across the university could also contribute to this initiative which would have the potential of attracting those students with aspirations to combine advanced studies in science with their practical application through innovative technologies.
- 12.50 Far from its traditions in vocational education Option Three presents an entirely different trajectory both for agriculture and related domains on the one hand and the historical traditions of the Hawkesbury campus on the other. Surprisingly, although this is the most conventional options presented here it is the one that is likely to attract the most critical attention. For while the study of science as it applies to technological applications in the natural world has a very long standing tradition within academia, technological advances in agriculture have not always met with universal acclaim or even enthusiasm. The current polemic associated with rDNA technologies in crop and animal production through genetic manipulation exemplifies public concerns about what some refer to as the Frankenstein syndrome.
- 12.51 Certainly the potential use of transgenic manipulations in agriculture, raise significant ethical as well as ecological concerns. They are matters that are not quickly or easily dismissed and they demand levels of intellectual and moral investigation which to date have certainly not characterised the discourse about the future of agriculture in this country. Again this contrasts with the situation in the United States and many European countries where the matter of the broad aspect of land and environmental ethics are garnering ever increasing attention. Somewhat paradoxically while this is true of both sides of the Atlantic the issue of genetic modification is apparent little concern in the United States and of paramount significance in Europe.
- 12.52 With the effectiveness and efficiency of electronic communication it would allow scientists operating at different locations to be members of an ongoing discourse and loosely affiliated academic group. The image here is of one laboratory with distributed leadership and functions. It would have the form of a self organising system.
- 12.53 There will be those who argue that this is the CSIRO clone. The major difference of course will lie with the concurrent emphasis on research and teaching. It would make sense indeed for existing for existing CSIRO scientists as well as scientists at other universities to join this virtual laboratory.
- 12.54 Unlike Option One, where the primary emphasis would be on developing innovative curricula and attracting committed undergraduates, this high-tech option might work in what might be called a top down manner. In other words the prime target would be graduate students. Undergraduate programmes would be developed as advances in sciences and scientific applications associated with the likes of nano-technology, genomics, transgenics and cognition, indicate demands for particular foundational knowledge.

Option Four

McColl Revisited

- 12.55 In contrast to the situation in the majority of the other states which have essentially centralised agricultural education into one or at most two universities, New South Wales continues to have four universities that offer degrees in agriculture.

- 12.56 Attempts have been made in the past to resolve this situation: In 1991 the University of Western Sydney Hawkesbury was not nominated as one of the providers in agriculture and related endeavours in the McColl report released in that year.
- 12.57 The authors of that report had argued in recommendation 10.5 *inter alia* that the government of NSW should '*as a matter of urgency.... establish a task force to address the question of the emergence of a single recognised provider of agricultural and related education in their respective regions.*' The Sydney region was one of seven such regions recognised but the nomination for that was left open.
- 12.58 The report went on to issue an ominous warning to the effect that given that the recognised providers would receive favourable funding allocations from the commonwealth government, it added to its recommendation 10.5 '*it would be appropriate for the commonwealth government to also play a role in this process*'.
- 12.59 A collaboration between the University of Sydney and University of Western Sydney Hawkesbury would have seen entirely appropriate as a consequence. UWSH would have brought its long experience in three year degrees to Sydney University with its four year degrees in agricultural science and economics. The academic profile of the combination would also have greatly been to the advantage of UWSH. The combined student enrolments would have amounted to in excess of 1500 undergraduates and a very sizable cohort of graduate students. UWS would also have brought its associate diploma programmes and students and of course its large estate.
- 12.60 Some sort of merger at that time between these two faculties at different institutions would have provided the synthesis of vocational with professional education that similar mergers in South Australia, Victoria and Queensland were to achieve in practice.
- 12.61 Back in the early nineties, UWSH would have brought much to such an endeavour with its long experience in three year vocational diplomas and degrees, in experiential education and action research, in educational innovation, and in the practical application of systems perspectives and approaches to development. It also had significant student enrolments at graduate as well as undergraduate studies, a talented number of academics, a very extensive network of cooperating farmers and others in the agricultural industries, and finally of course the physical resources including the 1300 hectare estate.
- 12.62 At the same time, Sydney University had long experience with four year degrees in agricultural science and agricultural economics, a very strong background in science and its application in practice and an eminent cohort of research scientists, graduate students and experienced educators.
- 12.63 This was a lost opportunity that could now, given quite different circumstances, be recaptured.
- 12.64 It is true to say however that conversations that were conducted between University of Sydney and University of Western Sydney were less than creative even though a significant number of the faculty at Hawkesbury were higher degree graduates from the University of Sydney. It would be equally true to state that considerable antipathy had developed between the two institutions over the eight decades or so of their independent existences, particularly over latter years. The educational philosophies adopted through the 1980's could not have been more different between the two. Other factors contributed to that antipathy including the fact that graduates from Sydney University were accepted by the Australian Institute of Agricultural Science whilst the UWS graduates were not. They had their own association with other colleagues from past agricultural colleges, in the Agricultural Technologists Association of Australia. It is a matter of record that these two societies would eventually amalgamate.
- Of the five options presented here this is the one for which focused initiatives have already begun. Structural Adjustment Funds have been granted by the Commonwealth Government

which is allowing conversations to already proceed between Professor Bellotti, Professor of Sustainable Agriculture and Rural Development at UWS, Professor Mark Adams, the Dean of Agriculture and Environment at Sydney, and senior representatives from Primary Industries within the Government of NSW.

- 12.65 Whilst it was stated at the start of this section that the five options were not mutually exclusive of each other, this particular pathway if consolidated would make it much more difficult to pursue the other options.
- 12.66 On the other hand given the willingness to collaborate within an atmosphere of cooperation and empathy for the circumstances that each finds itself in, it would be more than foolish to not continue to pursue these enquiries.
- 12.67 It would be anticipated that the discussions between the two organisations would be expanded at the earliest convenience to allow major stakeholder participation.
- 12.68 Further consideration should also be given to invitations to University of New England and Charles Sturt University pursuing the notion that was advanced many years ago of a multi-campus, multi-institutional State College of Agriculture and, perhaps, rural development.
- 12.69 From statements issued by the Australian Council of Deans of Agriculture and from submissions made to the Senate Enquiry it is obvious that no single provider of agriculture education in Australia is flourishing. Under these circumstances the notion of a State College of Agriculture would make sense.
- 12.66 Virtual learning packages would facilitate learning generated at one institution accessible by students at the others. Summer schools could be held at the different campuses and in fact it might even be seen that time spent at all four NSW campuses over the duration of a three or four year degree would have very significant advantages. Each would offer a set of unique facilities and at least in the case of New England and Charles Sturt genuinely rural locations, for what are urban or peri-urban students at the two Sydney establishments.
- 12.67 The peri-urban location of the Hawkesbury campus of the University of Western Sydney presents a novel opportunity too. In nations like United States and England as well as in a number of European Countries, there is an increasing focus on locally produced and marketed food. In towns like Totnes in England for example this proves an essential focus of what the citizens there, in common with counterparts in an increasing number of towns across the world including Australia, have envisaged as a transition town.
- 12.68 Much has been said of the challenges of Sydney 'feeding itself'. Urban spread continues to encroach upon what are now peri-urban lands suitable for cropping and other agricultural pursuits that can be intensive as well as relatively extensive. The Hawkesbury region of course was once a very productive agricultural area, but what were once fertile river flats for vegetable growing and orchards in particular are now turf farms or polo clubs. It is not inconceivable that money could be raised to purchase these lands and return them to food production.
- 12.69 With respect to this matter of funding it should be mentioned that Hawkesbury has long had its own Foundation. This was established in 1982 to help raise and manage funds through investments, gifts and so on that could be made available to developments projects on the Hawkesbury campus. It is not at all beyond reason to suggest that the activities of this Foundation in close liaison with the development office or its equivalent of the University of Western Sydney could help support developments associated with this option – and indeed with all five.
- 12.70 As Professor Bellotti is already indicating, it is also possible to attract considerable funds from industry by building and managing jointly funded initiatives such as intensive glass houses for vegetable growing.

Option Five

Sustainable Wellbeing

- 12.71 This is certainly the most radical and potentially challenging option of the four, yet in many ways it continues initiatives that already have considerable momentum within this university which has made an emphatic public commitment to sustainable development. This has been reinforced within the past few days by a statement from the Vice Chancellor recording that UWS has given its endorsement to the higher education treaty on education for sustainability which is being discussed at the UN Conference on sustainable development recently completed in Rio de Janeiro.
- 12.72 The University of Western Sydney has an opportunity that is probably unique in Australia to dedicate an entire campus to the pursuit of development within the context of sustainability for what might best be termed 'inclusive wellbeing'. This is captured in the statement of desired characteristics included in the Master Plan for the Hawkesbury Campus.
- 12.73 The Master Plan of the Hawkesbury campus of the University of Western Sydney is designed to both reflect and promote the University's commitment to the principles and practices of sustainability through education, research, development and community engagement. As a vibrant multidisciplinary 'exhibition' campus it will show a special regard for the social and ecological demands of sustainable living and for the integrated and sustainable use and management of productive, natural and 'built' landscapes with a particular emphasis on peri-urban environments.

Master Plan Objectives

- To forge a unique campus identity based on the desired future character as an 'exhibition campus' promoting the study of sustainable living principles and practices.
 - To promote sustainable principles and behaviour.
 - To retain and enhance the heritage character of the campus.
 - To establish a sustainability-focused, internationally recognised teaching and research environment.
 - To substantially improve the amenities, facilities and accommodation of the campus.
 - To provide an inclusive campus experience for all groups.
 - To promote engagement with the wider community.
 - To provide safe and efficient access and circulation throughout the campus.
 - To enable a campus that functions cohesively.
 - To manage future growth to provide a robust and flexible outcome.
- 12.74 The Office of Sustainability at the University of Western Sydney is already showing strong leadership in illustrating how the principles of sustainability can be interpreted into actions. Their recognition by the United Nations is ample evidence of the quality of this work which includes involvement with the River Farm which is part of the Hawkesbury estate although not directly contiguous with it.

- 12.75 There is a legion of examples of universities across the world that are taking initiatives in sustainability as indeed well exemplified by a very recent publication from the Global University Network for Innovation (GUNI)⁸ - .
- 12.76 There is the particular example of the University of New Hampshire which, as the language of the GUNI report suggests, is committed to the transition from understanding to actions that include all aspects of that university's endeavours. Like that university, Option Five here envisages the Hawkesbury campus as an entire expression of development within an ethos of sustainability in everything that it does. This emphasis on innovative development is deliberate for this is the very tradition of Hawkesbury – the *visionary tradition*. The ever escalating world population, the ever increasing demand for food, the ever pervasive growth in the pursuit of higher quality, protein rich diets all present enormous challenges for food production enterprises across the world.
- 12.77 Added to this, issues such as climate change, resource shortage and the loss of ecosystem integrity greatly amplify the need for continuing yet sustainable development of agri-food systems. The emphasis on systems here is very deliberate. Through the 1980's and early 1990's HAC/CAE thence UWSH were pioneers in the application of systems principles and practices to sustainable agricultural development and most especially for the learning that was necessary.
- 12.78 It was also amongst the first institutions in Australia to focus on Farming Systems Research.
- 12.79 Many lessons were learned through these experiences which saw Hawkesbury faculty engaged with many education and research initiatives across the world as well as in Australia. Amongst the most significant of these which was generated from experience but informed by theory, was the insight that applying systems perspectives and world views and adopting systemic development paradigms called for significant intellectual and moral development. The simple mantra here is that acts of systemic development in the social and material worlds demand the development of the epistemes (worldviews) of those who need to act. This concept gives a whole new meaning to the idea of 'higher' education as distinct from the majority of education labelled this way which is really simply 'more' education.
- 12.80 A shift to the adoption of sustainability as a context for agricultural and rural development represents a truly paradigmatic challenge. Paradigms, with their synthesis of 'ways of seeing' with 'ways of acting', are notoriously resistant to change – both by individuals and by whole cultures. Higher education for agriculture within a sustainability context calls for a transformation of prevailing worldviews and the development and promulgation of paradigms of action that represent the practical reflection of those worldviews.
- 12.81 It calls for genuinely *higher* (epistemic) learning not just *more* learning: Learning differently not just learning different things. It is a cognitive challenge of the highest order and finds support in emerging cognitive theories as well as empirical evidence from pedagogical innovations in many places across the world.
- 12.82 The 'sustainability turn' has truly profound implications for the transformation of education, research and public engagement with regard to the further development of Australian agriculture. Initiatives in this regard must be systemically and intimately inter-linked with

⁸ *Higher Education's Commitment to Sustainability: from Understanding to Action*. Global University Network for Innovation GUNI Palgrave Macmillan, 2012

sustainable development endeavours in food, diet and nutrition as well as in health, within a context of the quest for the inclusive well-being of humans and of the environment writ large.

12.83 Education for sustainability ought to be a truly national endeavour of the highest possible priority.

12.84 The paradigm of sustainability demands foresight as well as insight and commitment to it dictates preparedness for contingency and for contestation. It essentially places a priority on persistence into the future as the context for further developments in production and productivity today. It is concerned with a whole gamut of relationships between agri-systems and the complex dynamic networks of influences that the environments in which they are embedded present to them.

13 End Note

13.1 An important dimension in all of the options above is the identification and naming of an explicit academic group that would be responsible for the structuring and promotion of the initiatives. They also all demand leadership from a senior academic who would be relieved temporarily of his or her other duties to allow a focus on the matter at hand.

13.2 Strong liaison would need to be further developed between the initiatives and those responsible within the university for marketing courses as well as with the extensive population of graduates of programmes of agriculture, horticulture and food over the past two decades.

13.3 Contact should also be reinforced between those teaching agriculture in high schools as well as with the wide range of influencing organisations and associations that have been referred to earlier in the document.

13.4 As recorded earlier this document represents Part One of a two part report. Part Two is a continuing work-in-progress which will be available for further stages in the stakeholder consultancy as a resource. It is being written in narrative form consistent with an academic paper, and is fully referenced. A comprehensive collection of reports, academic papers and monographs have been collected, collated and filed and all of this will also naturally be available.

14 Acknowledgements

14.1 The assistance of all who participated in this inquiry is very greatly appreciated. Very many people gave very freely of their time and showed great tolerance of my questioning. While wishing to avoid singling out anyone for special mention, it would be entirely remiss of me not to express my profound thanks to two people in particular without whom this project would have been essentially still-born. So a special thank you to Rhonda Hawkins and to Lee Debais.

Attachment 1.

AGRICULTURE EDUCATION AT THE UNIVERSITY OF WESTERN SYDNEY

STAKEHOLDER CONSULTATION

TERMS OF REFERENCE

Background

1 Enrolments in Agriculture Programs

For some time the enrolments in Agriculture and related programs at the University of Western Sydney, as at the majority of other Australian universities, have been in decline. Notwithstanding various program reviews, including the establishment of an innovative new course (the Bachelor of Natural Science in Sustainable Agriculture and Food Security) offered for the first time in 2012 and an array of marketing initiatives, the University of Western Sydney has been unable to increase enrolments to a viable level. This situation culminated in the University deciding that it could not have an intake into the new program in 2012.

An initial communication campaign to advise the various stakeholders within and external to UWS was conducted once the decision not to have an intake was made.

A decision has been made to launch a review into issues impacting on current and potential future agriculture programs at UWS and Emeritus Professor Richard Bawden has agreed to conduct an initial investigation into this matter in consultation with a spectrum of relevant stakeholders.

2. Structural Adjustment Fund Project to increase interest in Agriculture Programs

At the end of 2011 the University was advised that it would receive \$968,000 in funding to implement a program to understand better the issues relating to the decline in Agriculture enrolments, and to develop a partnership with the University of Sydney to explore opportunities to build interest and enrolments into the future. Part of this funding is related to increasing student engagement and recruitment through the Primary Industries Centre for Science Education (PICSE) who build interest and recruit in high schools, and the remainder relates to the establishment and implementation of a possible alliance between UWS, Sydney University and possibly other partners related to Agricultural education and research.

Stakeholder Consultation Project

The first phase of the overarching project will be a consultation process with the key stakeholders for the UWS Agriculture program.

(1) Terms of Reference

The aims of the project are to:

1. Identify the key stakeholders to be consulted.
2. Prepare an overview of the points of discussion and the list of people/groups to be consulted and provide these to the UWS Executive and the Dean of Science and Health

for approval.

3. Conduct a comprehensive program of consultations within the aim of the project, and in close consultation with the identified stakeholders, covering:
 - a. The identification of recent trends in enrolments in agricultural education at UWS as well as at other national and international institutions of agricultural higher education;
 - b. The provision of a brief overview of education in agriculture and related disciplines at the University since the establishment of the institution in 1989;
 - c. Provide a context for the decision not to have a intake into the Agriculture program in 2012;
 - d. The identification and explication of key issues impacting on current and future agricultural education programs at UWS as well as at other institutions at home and abroad;
 - e. The generation of ideas and proposals that might be considered as the University works towards an agenda for new approaches to agricultural education at this institution;
 - f. The presentation of options for potential future programs at UWS.
4. Prepare a report on the outcomes of the consultations along with recommendations on next steps for consideration by the Executive.
5. Present that report to the Board of Trustees.

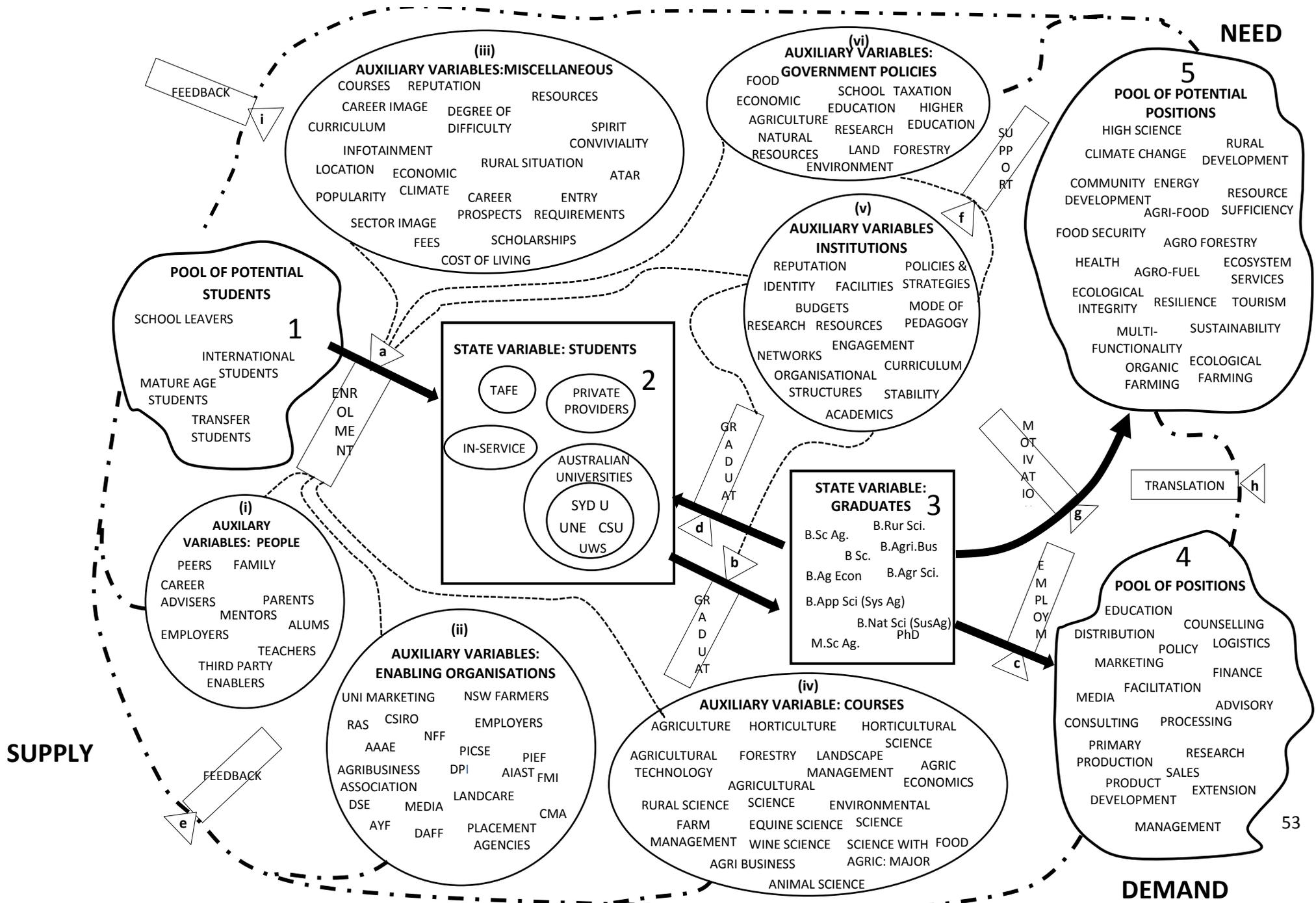
(2) Steering Committee

A Steering Committee to guide the project will be established. It will be chaired by the Dean of the School of Science and Health and will have membership including the Associate PVC (Education), The Vincent Family Fairfax Chair in Agricultural Sustainability and Rural Development, Professor Bill Bellotti and the PVC (Students) or his nominee. Other members might be appointed to the Committee on the recommendation of the Chair and with the approval of the Vice-Chancellor.

(3) Timeframe

It is anticipated that the project should take up to three months to complete.

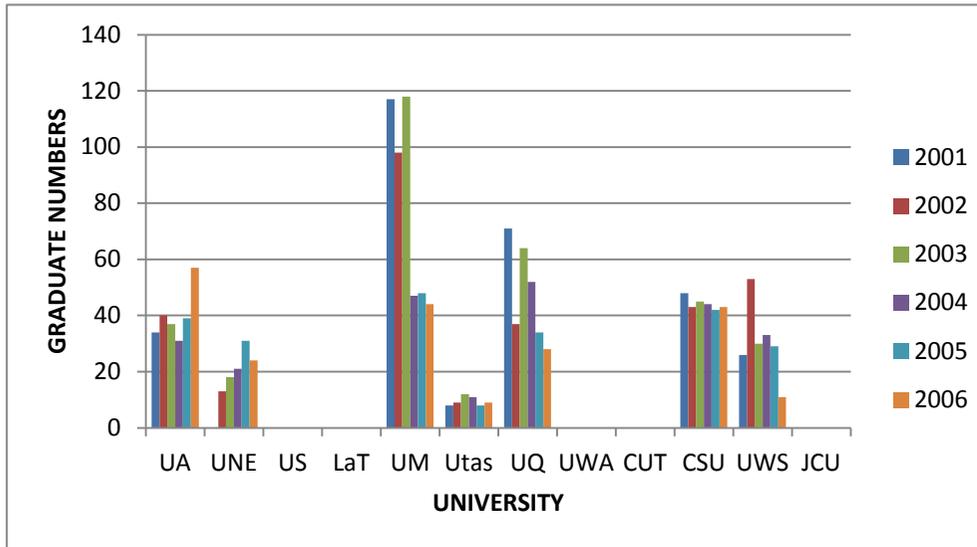
Attachment 2 – Systems Dynamic Model



Attachment 3 - Stakeholders and Literature

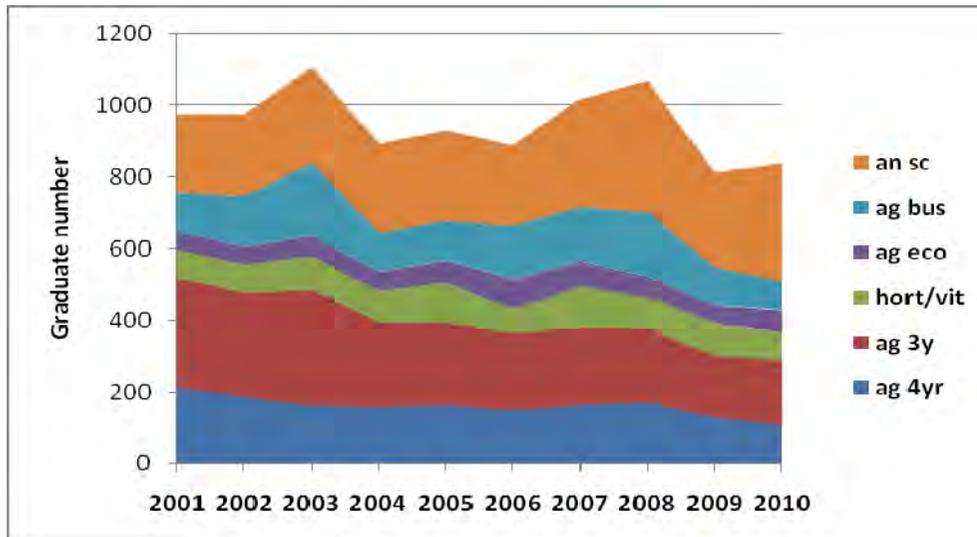
CATEGORIES	STAKEHOLDERS	LITERATURE
<i>Potential students</i>	Representatives from AAAE, CAA, PIEF, PICSE, RAS	Research reports from Australia and UK
<i>Enrolled students</i>	Currently enrolled UWS Ag students	Research report from Queensland University
<i>Graduates</i>	Agriculture graduates from UWS and UNE	
<i>Employers</i>	Representatives from Agriculture corporations, development banks, placement agencies, Government agencies, farmers	
<i>People influences</i>	Representatives from CAA, AAAE, RAS, UWS alumni, ag teachers, career advisors	Research literature in Australia and UK
<i>Organisational influences</i>	Representatives from NFF, RAS, DPI, AYOF	Submissions to national inquiries
<i>Programme influences</i>	Agricultural academics from UWS, CSU, UNE and universities of Sydney and Melbourne. Directors of colleges of agriculture: Tocal College and Harper Adams University College UK.	Submissions to national inquiries
<i>Institutional influences</i>	UWS senior executives, agricultural academics, past academics. Representatives from universities in UK, USA, France, Sweden, Denmark, Netherlands, New Zealand	
<i>Choice criteria</i>	Media representatives, senior university administrators	National reviews of agriculture education
<i>Government</i>	Representatives from DAFF, DPI, DSE, Universities Australia	
<i>Future needs</i>	Academics from Australian and overseas universities, Government representatives, futurists, representatives from NGO	Academic journals, 'futurist' journals, monographs

Attachment 4 – Trends in Graduation Rates for students of Agriculture in Australia



Graduate completions from individual Australian universities for three year agriculture degrees for the period 2001-2006

Pratley, J and Copeland, L (2008) Graduate completions in agriculture and related degrees from Australian universities, 2001–2006. Farm Policy Journal Vol. 5 No. 3, 1-10

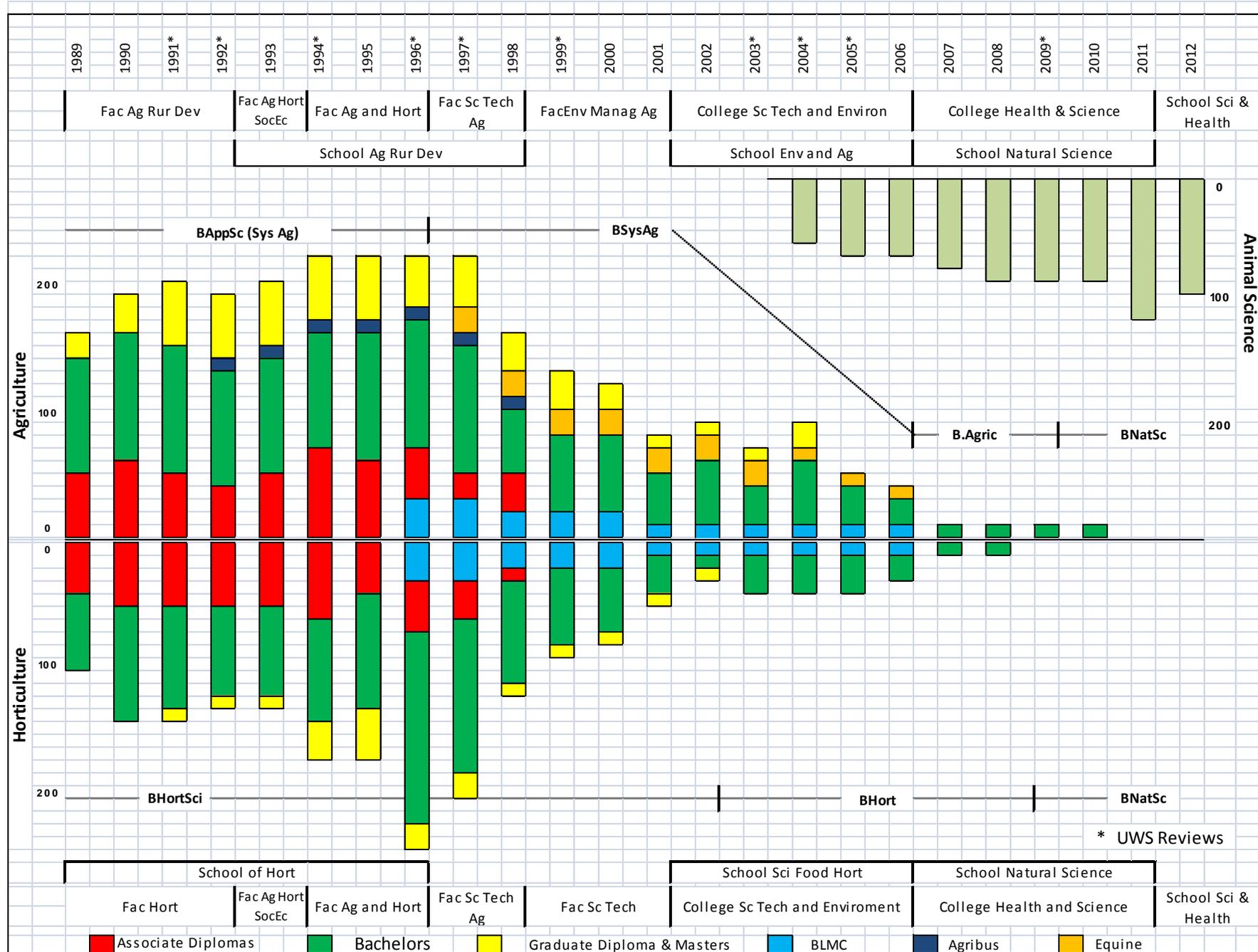


Graduate completions in 3 and 4 year courses in agricultural and related areas from Australian universities for the period 2001-2009 inclusive.

J.E. Pratley ACDA 2011

Figures taken from ACDA: Pratley, J.E and others

Attachment 5 – Synoptic Chart of First Year Enrolments at the University of Western Sydney including other information



Attachment 6 – Transitions of Colleges to Universities following the ‘Dawkins Reforms’

<i>McColl 1991</i>	<i>% PG</i>	<i>Agricultural College</i>	<i>University</i>		<i>Current Academic Unit</i>	<i>Degree Nomenclature</i>
337	-	<i>Muresk/ WAIT (1969)</i>				
			Curtin			B.Sc.
282	44			West Australia	Faculty of Agriculture	B.Ag.Sci., Grad.Cert.Ag.Sci., Grad.Dip.Ag.Sci. M.Ag.Sci.
722	12	<i>Roseworthy</i>			[R&D, CRC. Multi-sector, Vet.Sci. Ag. Anim. Sci] *.	
313	40		Adelaide		School of Agriculture, Food and Wine	B.Ag.Sci
445	7	<i>Longerenong VCAH</i>	TAFE			
"		<i>Glenormiston VCAH</i>	TAFE			
"		<i>Burnley [Horticulture] VCAH</i>	TAFE			
"		<i>Dookie VCAH</i>				
			Melbourne		School of Land and the Environment	B.Ag., M.Ag.Sci., M.AgrBus.
Six 59	2	<i>Gatton</i>			[R&D. Anim. Sci. Vet.Sci. Ag]*	
384			Queensland		School of Agriculture and Food Sciences	B.Ag.Sci., B.Biotech., B.App.Sci., Grad.Cert.AgrBus., Grad.Dip.AgrBus., M.AgrBus. Grad.Cert.AgrStudies., Grad.Dip.AgrStudies, M.AgrStudies M.Plant Protection,
7				James Cook		Grad.Cert.Trop.Ag. Grad.Dip.Trop.Ag.
907	-	<i>Orange</i>			[Distance Ed. Dental Fac]. *	
331	30		New England		School of Environment and Rural Science	B.Rur.Sc.. B.Ag Econ., B.Ag. B.Ag./B.Bus. B.Ag. B.Ag./B.Law. .Dip. Ag.
591	21			Sydney	Faculty of Agriculture and Environment	B.Sc.Agric., A.Agric..Econ
six77	7	<i>Wagga/ Riverina Institute (1976)</i>	Charles Sturt		School of Agriculture and Wine Science	B. Ag., B. Ag. Sci., B. Hort.. B.AgrBus. B.Ecol. Ag. Sys., M.Sus.Ag.
947	44	<i>Hawkesbury</i>	Western Sydney		School of Science and Health.	B.Nat.Sc. (Sustainable Agriculture and Food Security)
84	20			Tasmania	School of Agricultural Science	B.Ag.Sci., B.Ag., B.App. Sci.Ag., Grad.Dip Ag.Studies,
238	25			La Trobe	Department of Agricultural Sciences	B.Ag.Sci. B. AgriBus, B.Ag.Sci/B.Bus. B.Ag.Sc/B.Int.Dev.
221	55			NSW	ABANDONED	B.Sc.(Wool and Pastoral Science)

Attachment 7 McColl Report Data

Institution/Campus	Agricultural & Related Education 1990			Institution/ Campus Total Student Population 1989*
	Total Student Load (EFTSU)	Total Enrolments (Number)	Under- graduate Percentage of Enrolments	
Australian National University	161	196	77	6525
Ballarat University College	#125	127	91	3116
Charles Sturt University - Riverina	426	677	94	6635
Charles Sturt University - Mitchell	#98	125	100	5554
Curtin University of Technology - Bentley	17	27	0	14864
Curtin University of Technology - Muresk	272	336	100	~
Griffith University	#n/a	680	100	5988
James Cook University	7	7	0	4589
La Trobe University	211	231	75	13491
La Trobe Univ College of Northern Victoria	#69	81	89	3185
Marcus Oldham Farm Mgmt College	75	107	100	n/a
Monash University - Chisholm	48	71	35	8381
Murdoch University	#+243	367	86	5644
Royal Melbourne Institute Technology	107	138	100	12482
University College of Southern Queensland	54	59	78	8345
University of Adelaide - Waite	296	313	60	8847
University of Adelaide - Roseworthy	605	722	88	734
University of Canberra	#252	278	91	6737
University of Melbourne	513	545	74	21819
University of New England - Armidale	307	331	70	9681
University of New England - Orange	532	907	100	769
University of New South Wales	n/a	221	85	18540
University of Queensland - St Lucia	343	384	45	17807
University of Queensland - Gatton	636	661	98	1853
University of Sydney	588	591	79	18939
University of Tasmania	79	84	80	5481
University of Technology Sydney	43	59	100	11964
University of Western Australia	245	282	56	10190
Univ of Western Sydney - Hawkesbury	826	967	77	2284
Victorian College Agric & Hortic (six campuses)	583	745	94	861

- # Awards contain a substantial element of study not directly related to the agricultural & related sector
+ Estimate from data provided by institution
~ Included with Curtin University of Technology-Bentley
n/a Not available

Source: Supporting Paper 1, table 1; DEET 1989, Table 1*

Attachment 8 – An Agri-Food System Embedded in its Multi-Influence Environment

