



THE UNIVERSITY OF QUEENSLAND

**FACULTY OF NATURAL RESOURCES AGRICULTURE AND
VETERINARY SCIENCE**

Submission to

**STANDING COMMITTEE ON AGRICULTURE, FISHERIES
AND FORESTRY**

**INQUIRY INTO RURAL SKILLS TRAINING AND
RESEARCH**

JUNE 2005

EXECUTIVE SUMMARY

This submission is made by the Faculty of Natural Resources, Agriculture and Veterinary Science in The University of Queensland. It provides some background, followed by sections that address the individual terms of reference.

The submission provides broad comments relevant to each Term of Reference and, in each, addresses specific topics drawn from the Terms of Reference. It also provides comment on linkages between research, education and, where appropriate, extension. Most comment relates to the University's core business of tertiary education and research, although some comment is made on areas such as the Vocational Education and Training (VET) sector, especially where there is interface between the University and VET sectors.

The Faculty is particularly keen for a positive outcome from the Inquiry, leading to long-term sustainability of skills training and research. This will require well-funded and well-equipped institutions providing education and training with substantial links to research activities involving public and private providers. The Faculty believes this can best be achieved by identifying a limited number of key Institutions and providing funds for their expansion and development.

The Faculty identifies a number of areas where an injection of funds is necessary to gain the optimum benefit to the community for investment in agricultural education and research. It also makes suggestions on the types of linkages among education, research and extension that would enhance the three related activities. The submission concludes by providing a list of suggestions for improvement in Commonwealth support for education, research and extension.

1. INTRODUCTION

In this submission, the Faculty of Natural Resources, Agriculture and Veterinary Science will address individual Terms of Reference and make some limited additional observations on cognate disciplines. Most of the submission will focus on fairly broad policy issues. It will use the term 'skills' in the broadest sense, to include manual, managerial, technological and research skills and when necessary identify which are being addressed. The term 'course' will be used to describe study of related material in a similar way that 'subject' or 'unit' may also be used, while the term 'program' means the grouping of courses that lead to a qualification eg Bachelors degree.

The Faculty recognises the long-term decline in demand for agriculturally oriented programs, except for veterinary science, and the difficulty in attracting high quality candidates to agricultural programs at University level. It contends that a point of crisis in agricultural education has been reached that will lead to substantial undersupply of agricultural graduates and consequent severe skills shortages and loss of competitiveness of Australian agriculture. Contributors to the crisis include the comparatively poor image of agriculture, low starting and ongoing remuneration for graduates, perception that many locations of employment are seen as unattractive, despite the fact that many graduates work in urban centres, and the mistaken belief that agriculture as a declining industry with poor career prospects. There are difficulties attracting young agricultural graduates to regional and remote areas, although there are significant numbers of agricultural professionals working in these areas where substantial infrastructure, including research stations, exists.

Taken together, the Farm Dependent Economy (FDE, the part of the economy dependent on agriculture) contributes either directly or indirectly to 17.2% of employment in Australia (Econtech 2005, p.x), (407 000 in agriculture, 65 000 in agricultural inputs, including machinery, seed, fertiliser, chemical and animal health and 1.1 million in the farm output sector including food processing, animal processing, by product processing, transport, packaging, marketing and export), and research that underpins agriculture. The proportions of National Gross Domestic Product (GDP) contributions are: 3.2% (Agricultural sector), 0.8% (farm input sector) and 8.1% (farm output sector), a total contribution of 12.1% (Econtech 2005, p. ix). Clearly agriculture and agriculturally related employment are significant parts of the economy and should be recognised and supported.

The Faculty is concerned that there has been a serious lack of planning of agricultural education, with no national plan for a cohesive system. It is concerned that too often decisions have been driven by political rather than educational needs, and asserts that funding has been inadequate and poorly targeted, exacerbating the poor image of agriculture and agricultural careers.

The flight from science in secondary schools limits the supply of candidates with a strong science background and exacerbates the difficulty in attracting high quality candidates. To compensate for limited science background, the amount of sciences taught at University level must either be increased, or the level of science content reduced, with negative impacts on educational programs. The response has been a mixture of strategies, so that graduates may lack depth in understanding biophysical processes that underpin agricultural production and environmental responsibility.

The Faculty notes that many of the issues expressed above are included in previous reports, for example, in the McColl Report (1991) on agricultural education in Australia. The Faculty contends that agricultural education will be best served by a national plan for vocational and tertiary education implemented through well-funded and well-equipped institutions that have the benefits of critical mass in their areas of activity – this means a reduced number of institutions

offering agriculture is inevitable. Implementation of a national plan, though, will require a planning organisation that can make recommendations to Government, probably through Council of Australian Governments.

2. ADDRESSING THE TERMS OF REFERENCE

2.1. TOR 1. The availability and adequacy of education and research services in the agriculture sector, including access to vocational training and pathways from vocational education and training to tertiary education and work.

Availability of Education in Agriculture

There are numerous institutions, many with multiple campuses, offering education in agriculture and related disciplines as internal programs or by Distance Education. Programs range from VET sector Certificates to University Postdoctoral. Institutions include private providers, TAFE, Australian Agricultural Colleges Corporation (AACC) and Universities, located in metropolitan and regional areas. In addition to agriculture programs, other disciplines offer programs relevant to agriculture. For example, courses in biotechnology may complement agricultural programs or compete with them if similar content is included in, for example, Bachelor of Science (BSc), Bachelor of Agricultural Science (BAgrSc) and Bachelor of Applied Science (BAppSc) programs.

A search of StudyLink Australia, University and TAFE websites reveals at least 125 VET sector programs, 156 Undergraduate and 85 Graduate Coursework programs in agriculture and closely related disciplines in Australia. Research Higher Degrees (Masters and PhD) are offered by Universities, and numerous non-award short courses are offered by all participants.

Agricultural education is over-serviced, leading to unproductive competition and undesirable fragmentation of offerings limiting the ability of the overall system to mount new and innovative programs. Modern technology and emerging pedagogy and delivery paradigms may assist, but could also limit developments of critical mass of staff by maintaining dispersal of staff among institutions.

For vocational training, the large number of TAFE and other colleges/private providers offering agriculture leads to similar fragmentation so viable centres of training in selected aspects of agriculture are unlikely to emerge. Low student demand in individual colleges/campuses leads to an inability to provide adequate staff and other resources for these institutions, with the attendant risk of decline in standards and level of learning and skills acquisition by students.

The optimum configuration of institutions offering agricultural training can only come from a national review and planning process that transcends institutional and political demarcation issues and extends beyond short term political considerations. For example, it seems that Institutions and Centres of Excellence in the University sector could be established around agro-climatic zones, supported by specialist input from several Universities. There must be well-funded, well-resourced Faculties of Agriculture – we contend that the number of VET sector Institutions and Universities offering agriculture should be reduced.

Adequacy of Education

Adequacy of education is difficult to define, as requirements in the employment market change either incrementally or rapidly because of paradigm shifts and/or demands of the community through government. The current Government emphasis on skills training (rather than academic and research training) is directing students away from Universities (O’Keefe, 2005) and risks exacerbating shortages of professional agriculturalists. While the impact is unclear, initial negative impacts on student demand for Agriculture in the University appear to have occurred, but may translate into increased future demand for articulation to University programs. Whether there is a net gain or loss of enrolments in the VET sector, University sector or a combination of both remains to be seen.

Australian Universities have an enviable record in producing agricultural graduates of high quality. They have traditionally focussed on production oriented education and research training, underpinned by sound science. Recently, there has been a trend towards systems oriented education, incorporating the triple bottom line and the inherent need for soft sciences and people skills. The incorporation of communication, problem solving skills, people skills and team work using systems or holistic rather than reductionist approaches is progressing steadily. This is not to devalue the role of the reductionist sciences, but as employer requirements are now more diverse, the skill sets needed by graduates have widened. Universities have embraced this shift by developing educational programs accordingly.

A particular concern is the teaching of tropical agriculture, traditionally provided by The University of Queensland through Bachelor of Agricultural Science and Graduate Coursework programs and Research Higher Degrees. The establishment of a 4 year Bachelor of Applied Science (Tropical Agriculture) and proposed establishment of a Veterinary Science School at James Cook University will add capacity to that University and promote competitive pressures, especially with UQ, and lead to further dilution of demand within the sector.

Structure of Educational Programs

Undergraduate programs

In Universities, agricultural programs have generally been underpinned by basic and plant and animal sciences, economics and management in the first 1.5 to 2 years of 3 or 4 year programs, with some core material and specialisation an/or electives to suit students interests in later years. Some programs have industry experience/placement/internship courses to provide experience in employment, either as hurdle requirements or rigorous academic outcomes. This is similar to programs in allied health, medicine, dentistry and engineering. In program reviews of agricultural programs offered by The University of Queensland, widespread industry support for these inclusions has been received.

In programs which are broadly defined as ‘rural management’, ‘agribusiness’ and ‘natural resource economics’ the underpinning disciplines include economics, management, a range of business courses, with some plant and animal sciences, with specialisation in the later years being in disciplines central to the program name.

The level of elective choice remains high in many University programs. Substantial elective choice can cause inefficiency in teaching, thus limiting the ability of staff to undertake research. However, where the electives are drawn from compulsory courses in other programs or academic units, the converse can be true. A case for less elective choice can be

made, but is challenged by arguments for niche marketing of specialist skill sets. Reduction in elective choice would force Universities to focus on core disciplines and contemporary developments in agricultural programs, and be responsive so new developments are incorporated promptly. The problems here are identification of areas where demand is expected to increase substantially and the inability to resource these developments in the current funding environment

There seems to be no reason for radical change to program structures as outlined above, although meeting employer requirements needs to be considered carefully. Nevertheless, concern must be expressed at the reduction in chemistry, physics and mathematics in programs, with consequent reduction understanding in, for example, soil science, statistics, meteorology, economics, plant and animal nutrition. Teaching the underpinning sciences in context can help, but there are practical difficulties in implementation.

Employers require a diversity of skills, and Universities face the challenge of preserving desirable outcomes of traditional programs and adding new skills and competencies in an environment of declining resource availability. Mentoring new graduates would be helpful to professional development, and may require Commonwealth funding.

Postgraduate Coursework and Research Higher Degree programs

Development of research skills in biophysical and socio-economic disciplines must remain an integral part of postgraduate training in agriculture. Australian Universities have a strong reputation in Research Higher Degree training, and increasingly staff of relevant State Departments and CSIRO participate in advisory teams. The Faculty emphasises the need for enhanced support of these programs through existing mechanisms. For example, prospective Research Higher Degree (Masters, PhD) candidates often cite the low value of stipends and scholarships compared to salaries and benefits available in employment, even as new graduates, as a disincentive to undertaking postgraduate study. Increases in stipend and scholarship value are needed to attract the next generation of agricultural researchers and educators.

The introduction of Professional Doctorate degrees in some Universities provides opportunities for professional development of candidates who do not want or are unlikely to use Research Higher Degrees. However, the small number of potential candidates means economies of scale are unlikely without multi-University collaboration.

Graduate coursework programs provide retraining opportunities and an alternative pathway to entry into research higher degrees. They have been offered by Australian Universities for many years, but are becoming more focussed and better structured.

Declining Resources - An Issue of Concern

An issue that is of concern, though, is the educational rationale for course and program review being undermined by reform driven by resource constraints. Related to this is the adverse changes in staff – student ratios over recent years. While this Faculty encourages program reviews and reform to maintain program relevance and quality, it asserts that reform driven by resource constraints does not necessarily produce the optimum outcome. It also asserts that, as an expensive subject to offer, agriculture suffers disproportionately from declining resources, including inability to maintain facilities and infrastructure.

Relationship between Institutions

Most universities operate largely independently and are in direct competition for a limited pool of students. Although some steps to share resources have been taken recently, any significant impact is some time away. Nevertheless, existing collaboration based on complementarity exists, especially in relation to research and research training, for example, through ARC Centres of Excellence and Cooperative Research Centres, the latter including CSIRO and relevant State Departments.

Improving collaboration among Universities especially in undergraduate teaching utilising specialist centres or centres of excellence in individual Universities as the source of educational materials would be beneficial. Educational materials would be offered across Institutions using Distance Education (including external study and eLearning). For expansion of this approach, the Commonwealth funded Collaboration and Structural Reform program will need increased on-going funding.

Productive relationships between Universities and the VET/TAFE sector should be fostered. Competition is limited to Diploma and Certificate qualifications where these are offered by Universities. Of most interest is student articulation from the VET/TAFE sector to University programs with advanced standing. The facilitation of articulation requires close cooperation of the VET and University sectors, including academic and skills audits to maintain quality of University programs and graduates.

Availability of research services

The Universities of Adelaide, Queensland, Western Australia, Sydney, Western Sydney (Hawkesbury), Melbourne and New England have established traditions in agricultural research. More recently, Murdoch University, James Cook University, University of Southern Queensland and Charles Sturt University and to a lesser extent Central Queensland University and Charles Darwin University have also contributed to agricultural research.

The capacity to undertake agricultural research has been made possible, in part, by strong support from the rural industries funding agencies. Other providers of agricultural research are CSIRO, State Departments of Agriculture, and more recently private sector research providers. There has been a trend for closer cooperation between Universities, relevant State Departments and CSIRO in the provision of research and research training in agriculture, including co-investment in research facilities in most States. Both Federal and State governments have supported this integration and co-location. The CRC Program and Australian Research Council Centres Program have also provided research services to agriculture.

The recent moves towards greater collaboration among providers of research services need to be enhanced.

Adequacy of research services

Australia's agricultural industries remain globally competitive, which could lead to the mistaken conclusion that research services are adequate. Australia's present position reflects the substantial investment in agricultural research from the 1950s to around the mid-1980s. Investment in agricultural research since the mid-1980s has declined in real terms, and needs to be increased across the University, CSIRO, State Department and the private sector, or the competitive position of agriculture will be eroded. Reasons for the recent decline in research investment in agriculture include exponential growth in the molecular sciences (molecular biology, molecular genetics) which have provided technology to revolutionise agricultural industries.

The challenge is to capture the opportunities provided to benefit animal and plant based industries by investment in applications of the technology and research focussed on development and implementation of modified agricultural production systems. Existing Cooperative Research Centres (e.g. CRC for Beef Genetic Technologies; CRC for Innovative Dairy Products; Cotton Catchment Communities CRC; CRC for Value Added Wheat; Australian Biosecurity CRC for Emerging Infectious Disease, CRC for National Plant Biosecurity), ARC Centres of Excellence (e.g. Centre of Excellence for Integrative Legume Research) and ARC major Australian Centres of Excellence (e.g. Australian Centre for Plant Functional Genomics) can assist as all of them aim to harness expertise and build critical mass in agricultural research.

The ARC Special Research Centres Program does not represent the agricultural sciences except the ARC Centre for Functional and Applied Genomics which includes the human, veterinary and agricultural sciences.

Australian agricultural research would benefit from the establishment of at least two major institutes in agriculture. The institutes would be located within a university and might use the ARC Australian Centres of Excellence Program as a structural template. One institute could be located in southern Australia and provide integration, as appropriate, of relevant temperate agricultural research across NSW, VIC, SA and southern WA and a second institute could be located in Queensland and provide integration of tropical and sub-tropical research across northern Australia. CSIRO and relevant State Departments would be involved, and the Institutes would focus on major national agricultural research priorities that would be best researched by a multi-institutional collaborative approach.

Access to Vocational Education

The location of TAFE colleges/campuses in many regional towns and metropolitan and regional city locations is desirable. The incorporation of VET sector training in secondary schools will help meet some of the skills needed in agriculture, although may not be available where TAFE facilities are unavailable. The involvement of Registered Training Organisations embedded in Universities or Industry, for example plant nurseries, expands the reach of vocational training, and provides additional opportunities for training in industry – specific operational and management skills.

Pathways from Vocational to Tertiary Education

There needs to be more interaction between the VET and University sectors to improve the opportunity for articulation from VET to University programs while maintaining the quality and academic integrity of University programs. There is a significant problem of mapping VET sector courses and competencies onto University requirements to show equivalence of learning outcomes leading to credit for University courses. The profusion of skills modules, units of competencies and the like with multiple combinations that can be taken in the VET sector means that establishment of credit arrangements for articulation to University programs is difficult. The University of Queensland had formal arrangements with the Agricultural Colleges of Queensland. Changes in the Agricultural Colleges curricula mean that these arrangements are no longer tenable. A comprehensive National data base of academic and skills outcomes from the VET sector may help Universities assess articulation credit. An option could include an annual review, and in Queensland could be achieved by an annual meeting of the University, TAFE and AACC to review arrangements.

2.2 TOR 2 The skills needs of agricultural industries in Australia, including the expertise and capacity of industries to specify the skills-sets required for training, and the extent to which vocational training meets the needs of rural industries.

The term 'skills' can be broadly interpreted, and in the context of this Term of Reference appears to relate to manual, technical, record keeping, and junior to middle ranking managerial skills relevant to the VET/TAFE sector, but not high level skills in communication, problem solving, information processing and research.

The need for high level skills in communication, problem solving, information processing and research are repeatedly mentioned in industry submissions and responses to surveys conducted by The University of Queensland during undergraduate and postgraduate coursework program reviews. There is clearly need to ensure that traditional skill sets of University programs are at least maintained. They need complementing with advanced theoretical teaching and acquisition of communication, problem solving, information processing and people skills.

These added requirements need time to develop fully and resources for effective implementation. They also require interaction with the employment and operational environment of the professions and graduates. Implementation is expensive and time consuming, so courses of this nature need to be funded at the levels available for agriculture.

2.3 TOR 3 The provision of extension and advisory services to agricultural industries, including links and coordination between education, research and extension.

Availability and Provision of Extension and Advisory Services

The prolonged downsizing and rationalisation of government extension and advisory services raises the question of the relevance of the terms to many in agriculture, although they still have meaning in Natural Resource Management. The conventional concept of extension and advisory service (ie. a government service) in relation to mainstream agriculture, has largely

disappeared, but remains to a lesser extent in Natural Resources Management (NRM) contexts.

Both Government and non-Government providers are much too dependent on short-term funding, with short-term political horizons severely limiting the availability of these services. This weakness limits development of effective linkages between education and extension. Further, Government providers appear to be in a state of uncertainty and instability, with changes in divisional structure, operational principles, leadership and declining job security. Consequently, the credibility of these organisations can be expected to decline, especially as experienced staff depart.

Extension and advisory services have largely been replaced by commercial consultancy services in several industries, notably cotton and some horticulture, and by services provided by Agribusiness (input providers, output marketers), finance houses and the like. These services tend to be focussed among successful producers who take a business view of agriculture and are willing to pay directly for consultancy or indirectly as part of the price of an input or service. Government services are often seen to be focussed on crisis management, implementation of Government Policy and regulations, or support of poorer landholders, perhaps continuing lifestyle choices in their operations, rather than on agricultural development and promotion of production. The availability of services for these purposes provides benefits to the community, and in many respects, mirrors the counselling and support services available to urban industries and populations.

It remains to be seen whether the shift from Government to commercial provision of extension and advisory services is beneficial or detrimental in the long-term. Anecdotally, there is concern about the ability of consultants to maintain their knowledge and competence except in very specialised roles.

Links and coordination between Extension and Advisory Services

Extensive work is being conducted in Natural Resource Management in local, state and federal government agencies. However, the extent of coordination and the level of oversight that ensures non-duplication are questionable. Clearly, coordination and linkages between extension and advisory services and the growing commercial consultancy industry must be fostered to optimise exchange of information and outcomes for clients/client groups and to enhance staff development and competence.

Links and coordination between Education and Extension and Advisory Services

Most links involving the Group of Eight Universities (Go8) are informal, as these Universities have no formal extension and advisory role, but do undertake commercial consultancies. They also contribute to a limited extent through Cooperative Research Centres. This differs from the Land Grant university system in the USA. Examination of extension and advisory material available on websites of USA Land Grant Universities attests to the quality of material made available to farmers (but provides little or no information on how successful the material is in achieving its objectives).

It would be desirable to enhance the links between all Universities and Extension and Advisory services, as both groups should benefit from the feedback loops that would emerge. This, though, would require an injection of resources, and would have to be managed to

maintain or enhance established roles of academics in Universities. The possibility of co-location of extension and advisory services and Universities should be investigated.

Links and coordination between Education and Research

These are rather limited, except within the Universities, where a 'Research Led' or 'Research Informed' paradigm exists, as in the Go8 Universities, or is developing, as in some ATN Universities. However, these links can only extend to the activities of research active staff in Universities and their areas of interest, so substantial areas of research may not impact on student learning. The potential for additional links to develop through Cooperative Research Centres exists, and needs to be fostered. There has been some success in CRC postgraduate scholarships and multi-institutional advisory teams, but further development of both is needed.

Staff in Universities and Research organisations have heavy workloads, which is a serious impediment to developing and maintaining effective linkages at both personal and Institutional levels. Nevertheless, some mutually beneficial linkages at personal level do exist. The heavy workload of University staff can almost certainly be traced to redirection of Commonwealth funding and increased accountability requirements within institutions and to Government over recent years.

Reduction in funding for educational institutions and the competitive grant system for research has fostered competition between research providers. Attempts by Universities to supplement funding with research grants can bring them into competition with other organisations seeking funds from the same source. However, notable research successes have involved collaboration, including those collaborations that have led to ARC Centres of Excellence. Further, substantial collaborations have existed between universities, CSIRO and state departments of agriculture. Clearly, these beneficial arrangements need to be preserved and collaboration enhanced to obtain the optimum outcome for the research dollar and to provide linkages to undergraduate teaching and research training.

Links and coordination between Research, Extension and Education

These links have historically been relatively poorly developed, because of artificial separation of them. However, one of the benefits of the Research and Development Corporations, Cooperative Research Centres and groups like the Agricultural Production Systems Research Unit (APSRU), and the Centre for Rural and Regional Innovation - Queensland (CRRRI-Q) is that the opportunity for linkages to develop and expand, and will become more important as Government Departments focus more on research and development, while reducing involvement in extension. Substantial further development will depend on additional investment and perhaps a revision of the model being used. The issue remains, though, of availability of extension and advisory professionals to participate in these organisations and be available to clients. Active involvement of educational institutions will be imperative to linking of Research, Extension and Education.

2.4 TOR 4 The role of the Australian government in supporting education, research and advisory programs to support the viability and sustainability of Australian agriculture.

Role in supporting Education

Vocational

Most vocational education is provided by State Governments (through Education Departments and fees) or private providers for a fee. Thus, the Australian Government can have only a limited role, including negotiating agreements among providers on core competencies and skills that are required, and provide the regulatory environment, where it has powers, to foster vocational education.

The proposed Federally funded and managed Technical Colleges, which may be located in regional areas will provide competition with the existing system. In the absence of detail of these proposals, no firm statements can be made. The Faculty contends, though, that further fragmentation of training in agriculture is undesirable and counterproductive, and that articulation arrangements with Universities required.

Tertiary

An ongoing supply of graduates in agriculture is vital to the long term viability, international competitiveness and sustainability of agriculture in production, environmental and socio economic terms. The prolonged decline in undergraduate enrolments means that skills shortages and knowledge deficits will emerge as significant constraints to agricultural productivity in the very near future. It must be remembered that lead times to overcome such constraints will be lengthy.

Strong and active Agricultural Faculties that are well-equipped, well-resourced and able to respond to changing employment needs are essential to provide suitably skilled graduates from undergraduate and postgraduate programs. As the single largest source of funds that support University education in agriculture, the Australian Government has a key role in optimising delivery of education programs. The need for cooperation of the States is likely to make any move to reduce the number of Universities providing agricultural education challenging.

The Australian government has recognised the cost of provision of agricultural education by placing agriculture in the highest Commonwealth supported funding cluster, a placement that must be sustained over the long term.

3. SUGGESTIONS FOR IMPROVEMENT IN SUPPORT

The Australian Government needs to provide adequate research infrastructure for agriculture, and be pro-active in providing the infrastructure and education to meet emerging or potential challenges to Australian agriculture. Throughout this submission, suggestions for Commonwealth action have been made. They focus on education, research and extension, and recognise that these are linked, and consequently the same strategies may appear under each in the listing of strategies that appear below.

Role in supporting education

- (i) increasing overall investment in agricultural education;
- (ii) ensuring that educational institutions are well-funded and well-resourced;
- (iii) ensuring institutions have critical mass of staff for effective implementation of programs;
- (iv) implementing strategies to reduce fragmentation and duplication;
- (v) supporting collaboration in education programs, especially in areas of specialist knowledge and educational delivery technology;
- (vi) facilitating articulation from VET sector to University programs;
- (vii) supporting professional development of agricultural graduates through enhanced postgraduate scholarships, including post doctoral fellowships, and supporting graduate mentoring programs;
- (viii) facilitating and supporting linkages between research, education and extension
- (ix) establishing Centres of Excellence in agricultural education and two Institutes for Agriculture, one each in Southern and Northern Australia.

Role in supporting Research

- (i) increasing overall funding and support for agricultural research directly and through Research and Development corporations, CRCs, ARC Centres of Excellence;
- (ii) facilitating and supporting collaboration in research involving Universities, relevant State Departments, CSIRO and private providers;
- (iii) supporting professional development of agricultural graduates through enhanced postgraduate scholarships, including post doctoral fellowships, and supporting graduate mentoring programs;
- (iv) facilitating and supporting linkages between research, education and extension;
- (v) establishing Centres of Excellence in agricultural education and two Institutes for Agriculture, one each in Southern and Northern Australia;
- (vi) identifying and then supporting with major funding several national initiatives in targeted strategic areas of national priority.

Role in supporting Advisory Programs

- (i) facilitating and supporting linkages between research, education and extension;
- (ii) facilitating involvement of extension and advisory services in CRCs;
- (iii) supporting conferences and workshops that are specifically designed to facilitate development of extension and advisory staff by creating linkages to research and education professionals and institutions.

References

- Econtech Pty Ltd 2005 Australia's Farm Dependent Economy: Analysis of the Role of Agriculture in the Australian Economy, Australian Farm Institute and Horticulture Australia.
- O'Keefe, B. 2005. Masses move to VET for jobs. The Australian, 18/5/05. News Limited, Adelaide.