

EDUCATION FOR AGRICULTURE

A Discussion Paper

Prepared by the Education Committee of the South Australian Division of the AIAST.

1. PURPOSE

The purpose of this discussion paper is to examine the current environment as it impinges on education for agriculture, highlight the key issues, and provide a basis for further debate and action.

In the context of this paper, Agriculture includes both the production industry encompassing farming, horticulture and pastoralism and agribusiness sector including its input and output (value-adding) services sectors. The term “applied training” refers to a sound understanding of agricultural production, farm management economics and natural resource systems, and the scope of education covered is post secondary.

The paper is based on limited formal research given that a very detailed examination is beyond our resources. Although it makes reference to some recent studies, to some extent it contains assertions and judgements as it draws upon the experience and judgment of those involved in the field. In many cases, research to confirm or disprove the veracity of those assertions and judgements would be extremely difficult

The paper is based substantially on the South Australian situation. It is intended that the paper will be forwarded to each State Division of the Australian Institute of Agricultural Science and Technology (AIAST) for comment. With such comment incorporated, it is intended that the paper will provide a basis for a debate on the issues at a workshop in 2006 aimed at producing a series of firm recommendations to go forward to the key stakeholders.

2. BACKGROUND

In recent years concerns have been expressed that the education needs of agriculture are not being adequately addressed.

Agriculture faces challenging times not just from market and cost pressures, but also from changing international policies, the incorporation of technology developments, and pursuing of new opportunities.

It is vital that the next generation of practical researchers, farmers, and those that provide services to agriculture are adequately trained and have the opportunity to regularly update their knowledge and skills. Unless this is effectively achieved, other policies to support agriculture are unlikely to be effective.

The problems faced by agriculture are in some respects not dissimilar to those faced by training for industry in general. There is a clear national need, which is not being met by the institutions whose responsibility it is to do so. The recent publicity regards skills shortages and TAFE are evidence of this.

The last substantial review of agricultural and related education was conducted around 15 years ago (**McColl et al. 1991**). Most of the recommendations in that report are still relevant; regrettably many have not been acted on. In recent times there have been a number of studies conducted or in train, which at least in part relate to agricultural science. An example is the **IAST submission to the DEST Science Skills Audit 2005**.

However, there seems to be no single purpose or “glue” which pulls together the main issues in a manner that leads to clear recommendations on future directions and their implementation.

The IAST is the professional body, with a clear mandate and responsibility to review and understand the current situation, identify any deficiencies and ensure that the various stakeholders respond effectively. Although the task is potentially huge and complex, the SA Division has accepted the challenge of developing the initial discussion paper.

3. THE CHANGING AGRICULTURAL ENVIRONMENT

- Agriculture continues to face a number of challenges. With profit margins in production declining and costs continuing to increase, the terms of trade are declining and risks are becoming greater. Production agriculture as a percentage of GDP continues to decline.
- Yet despite this, in a recent report, the Productivity Commission describes both an expansion in production agriculture in absolute terms and a sound rate of growth, which are likely to continue. This report also indicates that one of the key drivers for productivity growth will be the availability of appropriate tertiary training (**Productivity Commission 2005**).
- The face of agriculture has changed enormously over the past 15 years, with greater emphasis on product quality issues, vertical integration from production to consumer, diversity in demand options, and environmental, welfare and ethical issues.
- The average age of farmers is now 54 years, with many interested in retirement. For example, FarmBi\$ data indicate that 27% of South Australia’s farmers intend to retire in the next five years (**AAA Solutions Survey 2003**).
- There has been, and will continue to be, an amalgamation of farms into fewer, larger, more commercial units, and the emergence of a lifestyle-farming sector, with either small farms increasingly supported by off farm income, or by hobbyists.
- Commercial agriculture has become a more intellectually demanding management pursuit in technical, financial, environmental and social terms. New technologies require an appreciation of the background

scientific principles for adoption, and a greater capacity to analyse the financial implications and risks.

- This trend will continue and probably intensify as input costs continue to increase, markets become more open and volatile, and margins decrease. The vagaries of climate are unlikely to diminish, even though the ability to manage climatic risk may improve. It will need to if the current predictions with regard climate change are accurate.
- Better risk management in terms of the technical, financial and natural resources deployed in agriculture will increasingly become a key to success.
- The fact that agriculture does not have the political clout it once had is being reflected in the priorities of government at all levels, and by managements of tertiary institutions. Neither plays an active part in researching the needs or in setting directions. Governments are more interested in promoting the “vote grabbers” such as health, education and law and order, at the expense of those areas which create the real wealth on which all other depends, these being agriculture, mining and innovation.
- State and Commonwealth governments have reduced budgets to agriculture departments. Research and extension capabilities have been slashed and those that remain rely increasingly on outside funds or fee for service.
- The funding balance in agricultural research and extension has been shifting from the public sector agencies to the research corporations
- Research strategies of R&D Corporations tend to concentrate on more immediate gains for farmers, at the expense of pursuing longer term, often more innovative but higher risk activities that were once common in Universities and CSIRO.
- An instability and inefficiency has developed, brought about by the disproportionate time spent in negotiating funding and the short term (usually three years) approach to the staffing and funding of projects. There seems to be an expectation by the funding bodies that appropriately trained people will be available as and when required to meet the requirements of specific strategies/projects. Few have a clear training component in their strategic plans. This has led to fewer people studying for higher degrees. There is a preference to go into agribusiness instead – they are frequently better paid and more secure.
- Agriculture seems to lack the prominent science leaders it once had – such as Donald, Collis George and the like. In fact some would say that a lack of leadership generally is a major issue facing the industry.

4. EDUCATION SERVICES FOR AGRICULTURE

The changing agricultural environment influences the demand for education services. An important question is whether the supply side is responding adequately. The industry changes foreseen (**McColl et al 1991**) have happened, but the agricultural education seems to have lagged in its response.

The following discussion points cover a range of factors relating to the demand and supply of education services for agriculture. Some are factual statements, some are assertions, and some are questions.

4.1 Demand

- There is an important difference between industry demand (needs) and student demand for tertiary education in agriculture.
- There has been a tendency for those involved in agriculture to write the industry down. That includes farmers, their organisations and the education sector. Whilst agriculture may not be as glamorous as some other professions, it does still make an important contribution in economic and natural resource management/stewardship terms. Those who participate also find it a challenging and satisfying career path.
- Student demand is influenced by the somewhat negative community perceptions about agriculture, fostered by the media, conservation interests, and to some extent inadvertently by farm organisations themselves.
- Nevertheless, a recent study shows that agriculture is responsible for 17% of the nations job opportunities (**AIASST Weekly Alert, Number 36, 18 October 05**), that there is strong demand for agricultural science graduates, and a wide range of job opportunities available in the agriculture and natural resource sectors. This indicates a possible gap between industry employment demand and potential student perceptions.
- Entry scores for agriculture courses have been low, reflecting a lack of student demand rather than the intellectual demands of the courses themselves. The low scores tend to demean the profession's image, which in turn feeds back to reduce student demand. It is pleasing to note that this seems to be changing in more recent years.
- The value of teaching agriculture in high schools is being questioned. The image is that it attracts the less academically inclined students and may in fact be having a negative impact on the image of tertiary agricultural education and hence on student demand. This perception needs to be checked against the evidence that it is also changing.
- Frequent changes are made to tertiary courses. Communicating effectively to the target student audiences the nature of these changes and how they will improve the prospects of meaningful employment is complex, and frequently not well addressed.
- There appears to be little marketing effort aimed at attracting students from rural and regional areas – students who would be expected to have a natural affinity for the subject area.
- Those commercially focused farmers that appreciate the need for greater knowledge and skills are either trying to acquire them for themselves, ensure that their children successors have them, or employ consultants with those skills.
- Agribusiness in general, providing both input and output (value-adding) services, also shares the concerns of farmers regarding the need for greater skills and knowledge in order to compete effectively in markets both domestic and global. There is an acceptance of the need to

maintain high professional standards, a fact reflected by the development by the AIAST of a new accreditation program for professions working especially in the advisory area. This has been established in response to feedback from industry.

- There has emerged the need for a breed of generalists skilled across a wide range of disciplines in sciences (agriculture, environment, natural resources, etc) and in social sciences and commerce. These graduates need to have a high level of problem solving skills, have substantial technical networks, and need to be scientifically competent AND able to work effectively with the community at large at all levels. These people are employed by the plethora of boards, councils, authorities, agencies, corporations in the private, corporate and government sectors.
- Perhaps the problem is that the quality of applied training in agriculture at the universities is generally perceived to be not credible with the leading innovative farmers, or with agribusiness. There needs to be a clearer understanding of demand and opportunities in the market segments the universities are seeking to service.

4.2 Supply

Universities – under-graduate

- For many years Universities have taken a supply driven approach to awards and course content. This is based on a mix of inadequate understanding of demand (often based on the views of advisory groups who themselves have an inadequate understanding of industry and often respond too late), what they think might attract students, and what they have a capacity to provide.
- There is little evidence of professionally run market research focused on sector tertiary education and training demand in turn influencing the design of course awards, content, or its mode of delivery.
- There has been a major shift in agricultural courses at universities in recent years. For example:
 - Agricultural courses have become part of a broader set of science offerings and have lost their identity and focus;
 - Courses are more focused on the fundamental aspects of science such as molecular biology, at the expense of courses which provide a more integrated appreciation of the component science disciplines. In other words, there has been a strong shift from the generalist to the specialist, which some say has been accompanied by a reduction in the capacity of graduates to analyse and synthesise situations problems and opportunities;
 - There is a need to make a clear distinction between the educational needs of applied scientists and those of the more specialised ag scientist.
 - Those applied courses which do exist need to achieve the integration and balance between the natural resource

stewardship, production, financial and social components of successful systems management;

- There has been an increase in the natural resource component. However, there is a lack of farm management and marketing training, such as might suit the future generation of commercial farmers, consultants and agribusiness.
 - The traditional agricultural colleges, which provided the more practical courses, are now part of the university system and in Victoria, NSW and SA at least have either been rationalized or their very existence is threatened;
 - The emphasis seems to be on securing external research funding rather than on teaching. This calls into question the core business of the universities. The recent statements by Minister Nelson (when he was in charge of this portfolio) about streaming universities into separate teaching and research institutions must ring alarm bells for those in agriculture where the integration of the two is fundamentally important.
 - Most universities face financial difficulties and will seek to solve their problems by cutting low demand, high cost courses, selling off assets, and concentrating on courses which generate the highest net return. Agricultural courses are likely to further suffer from all such options.
 - Education in agriculture and natural resources is resource intensive in both absolute and per head terms and is therefore often targeted when the institutions need to make cuts. In several areas, universities struggle to maintain critical mass.
 - Most Universities are trying to maintain their current range of courses and, given the competitive culture between universities, there seems little willingness to rationalize between institutions.
 - To quote one experienced observer, “we have a dynamic agriculture, being served by rigid tertiary institutions”.
- There is a plethora of agriculture-related courses being offered across Australia. This may be regarded as meeting demand but results in maximising supply. The fact is that it creates a real problem of communication and marketing to entrants. The very number of courses and breadth of offerings raises the question as to whether the necessary resources are available in the various disciplines to provide a quality education product. It is also hard to imagine that there is not unnecessary duplication.
 - The number of courses is in part a reflection of attempts by universities to adapt their offerings to meet what they or their students perceive to be current and future employment opportunities.
 - It may not be possible for each institution to provide a general applied and integrated course which embraces the necessary sub disciplines (such as soil science, entomology, pathology, animal husbandry, horticulture, etc) because either they cannot fund it or the disciplinary resources are not available
 - Some would question whether or not agricultural science as a profession is in permanent decline, and is being replaced with

specialist interest groups such as biotechnologists, animal geneticists etc who have established their own professional networks. Is there no longer a need for the “generalist” agricultural scientist who understands the agricultural and natural resource systems, and if so, does it matter?

- It is also important to recognise that some of the employment requirements of the agriculture are being met by graduates or experienced professionals from disciplines other than agricultural and related education disciplines.
- The overall solution is unlikely to rest with the TAFE system which is having even less focus on the needs of agriculture and is generally not as well equipped to meet those needs at the level required.
- TAFE colleges, however, can provide entry to post-secondary education and articulation to Universities through a credits system. They do provide experience and an easier transition into tertiary learning, as well as delivering valuable education and training products in their own right. The TAFE/University link is being constructively pursued in several States.

Universities – post-graduate and continuing education.

- There is very little attention paid to continuing education in the sense of life long learning. Is this because there is no demand, a lack of supply, or a failure to create the link between the two? There appears to be a need but it requires a new system of delivery.
- Ideally, there should be a close relationship between research and teaching. Therefore the changes outlined previously in the research area will impact on teaching. We already see shortages of experienced lecturers. Research contracts often don't provide for a teaching component, and therefore there are limits placed on the availability of those resources for teaching.
- Public funded entities such as State Departments, CSIRO, CRC's and Universities are now required to self fund more through commercial activity. One of the downsides been the reduced capacity to train and mentor young graduates in-house? Has the conduct of good science been replaced by the need to meet the funding body and commercial provider agendas?
- Departments no longer have the capacity to perform what was an important role of first point of entry and to provide practical training under experienced generalist practitioners. This of course is pertinent to the AIAST initiative to take the lead in revamping accreditation. One can draw the parallel here with the legal profession which insists on practical exposure with experienced practitioners before letting young graduates loose on the community. Why is agriculture any different?
- In the private and public sectors, there is less employer-subsidized tertiary training. Gone are most of the industry traineeships.
- Most professionals are now employed to undertake a specific task or tasks usually for a short contract and often with little prospect of continuity of employment. The employer expects the person to be professionally equipped to do the job from day one.

- The professional in today's world needs to be ready to equip him/herself for, not only the next contract, but for a varied and challenging future career pathway. This perhaps is leading to a demand for a new system of intense and high tech skills training.
- In the agribusiness sector, it seems that much of the employer-funded training is aimed at broadening the skill base. This in part may be a reflection of the greater level of vertical integration in agriculture with many firms engaged in such things as input supply, production, processing, marketing, freight and logistics, finance etc.
- Industry and agribusiness are increasingly providing in-house training and accreditation for technical and advisory staff. For example, FIFSA/AFSA have recently introduced a national training-accreditation-auditing system for staff employed in the fertilizer industry. The same applies in the food industry.

5. THE ISSUES

The previous discussion highlights the need for a better understanding of the current and future needs for post-secondary education for agriculture and to urgently address how best the demands (needs) of agriculture in all its sectors can be met.

The following is a set of issues for consideration.

5.1 Demand vs Supply Driven

The future directions for agricultural education must be driven by thorough understanding of the demands of the various sectors of the industry (rather than the traditional supply driven approach). It requires an independent review, based on competent research which engages all sectors of the market and considers all options, not just those relating to individual universities.

5.2 Which Demand Streams?

Given the many categories of agricultural employment, which are the most important to get right?

It is suggested that these be:

- Research
- Extension and Consulting
- Commercial Farm Management
- Agricultural management systems.

6 Rationalization of the education delivery sector

Agricultural education has high per unit costs and does not attract overseas students to the same extent as many other courses. It will therefore always be under pressure. Taxpayers should not be expected to continue to fund the current structure. Opportunities must exist for rationalization through concentration of resources at fewer centres in order to maintain critical mass, students doing different parts of their course at different locations, and the

development of on-line teaching. This would probably mean that some universities would get out of agricultural education altogether

4. Generalist vs Specialist Training

There has obviously been a trend towards more specialist areas, at the expense of the broader, more integrated courses of previous times. A desire to return to the past is not of itself adequate justification for change. However, the changes occurring within industry would seem to justify reconsideration of this balance. It is obvious that such a change should involve greater emphasis on systems integration, financial and risk management, and on commodity marketing, as well as the range of technical subjects.

5. The Relationship between Research and Teaching

It is well accepted that it is important to retain a close relationship between the research and teaching functions. However, the changes in research funding from in-house to external, be it from research corporations or commercial activity, have resulted in less emphasis on the teaching component. How can this issue best be addressed?

6. Standards, Accreditation and Continuing Education and Training

There is, or should be, a linkage between training and the maintenance of standards, especially in the advisory service sectors. AIAST is currently reviewing the CPAG professional accreditation arrangements and these need to be taken into account as part of future demands for basic and continuing training.

7. How to Achieve the Changes and fulfil the Role of the AIAST

The AIAST seeks, as part of its mandate, to service its members, influence policy as it affects its members and the agriculture sector generally, and act as the independent, expert voice of the profession.

A key question is how can the AIAST influence beneficial change in the knowledge providers?

Apart from pursuing a general change agenda in education for agriculture, should the AIAST play a more direct brokering role in the provision of continuing professional career training services as part of an increasing role in maintaining and improving professional standards?

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