CONTRACT REVIEW

EFFECTIVE AND EFFICIENT STRATEGIES TO SUPPORT INDUSTRY LEARNING

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SUMMARY

Two key directions for future extension and education are specialist services meeting a local demand and broad approaches based on holistic learning systems and/or integration between previous separate groups or institutions. Four case studies of education and extension are presented to illustrate these directions. One challenge is to achieve synergy between differing groups, requiring process skills in managing change and aligning different cultures. Another challenge for future extension and education will be the development and application of rigorous and efficient needs assessment and evaluation processes to enable participants to choose/design the most applicable approach. Learning and collaboration underpin future competitiveness, but must compete with other ways of doing things. Participants and resources will be attracted only if they perceive measurable returns to their investment of time and money.

INTRODUCTION

In the 1990s, Australian industries, including the animal industries, have recognised that the future lies in global markets. Commercial survival in the animal industries will depend firstly on being competitive in the global sense, and secondly on developing and delivering specialist products for particular niches. Our thesis is that extension and education services face similar requirements. In future, provision of extension and education will take a range of forms through negotiation with stakeholders who have multiple perspectives, and in response to both immediate and longer term problems or opportunities. Current trends in education and extension provision support our thesis.

While discussion of extension services in the 1980s focussed clearly on the government extension services who were perceived to have lost their way and to need a new direction (see, for example, Russell *et al.* 1989), government extension services in the 1990s have moved clearly to act as an instrument of government policy in relation to broad issues such as sustainability, resource management and market access. Other areas of service such as specialist production services require different arrangements. In many cases new needs are being met by liaisons between existing institutions (university and government, government and private sector), and by development of community and industry based initiatives. Such arrangements recognise that extension is but one of many activities which contribute to learning and to progressing issues affecting the future development of agricultural industries.

The educational requirements of tertiary students also reflect the multiple perspectives which exist in relation to the issues which surround agricultural industries. If universities enable both staff and students to participate as stakeholders with strong and well developed positions informed by established knowledge and with skills to communicate and negotiate their positions, they make an important contribution to creating a rich forum for discussion, negotiation and further learning. These processes will underpin the continuing competitiveness of Australian animal industries in global markets.

To demonstrate the likely range of future extension and education approaches, we present four short case studies. The first (Egan and Falvey) reviews changes to university educational services which are more integrated with other services relating to animal industries, by reviewing the Land Grant Universities in the USA and relating these to current developments in Victoria. Sriskandarajah *et al.* argue the need for education and extension to adopt a new critical learning system based on a constructivist view, recognising multiple stakeholders and acting in inclusive, participative ways. Hartley outlines a move in New South Wales to formalise and expand on strategic alliances between government extension services and agribusiness, while Clark reports on a participatory learning process to develop local best practice which has been adopted with striking success by groups of beef producers

in central Queensland. In response to the case studies, some key questions relating to the future contribution of education and extension to Australian animal industries are discussed.

CASE STUDY 1: LAND GRANT COLLEGE MODELS

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The Lund Grant concept

In the USA, the Morrill Act of 1862, through which colleges of agriculture and mechanical arts were born, arose out of a dual national need: for higher education to be generally accessible to people and useful to their everyday lives. The Hatch Act of 1887 establishing the Agricultural Experiment Stations then enabled a linked research and extension service to be developed, expanding knowledge and bringing it to a stage of implementation. This integration of teaching, research and extension is a core strategy serving the Land Grant College vision (Yates 1994; Meyer 1995). The LGCs were founded with a "sense of place - an integrated landscape containing people who needed help". Outreach is a systematic widening of communication on a mutual benefit basis. It is seen as a key to improving performance in education, research, extension and community service. While all of these are University commitments, they are funded through separate Federal and State budget paths.

Today, colleges of agriculture at LGCs are seeking to define new academic programmes consistent with the land grant concepts but in tune with modem needs, to accommodate new demands amid reduced and changing sources and conditions of funding (Westerndorf *et al*. 1995). The influences are the changing global economy, diminishing proportional contribution of agricultural commodities to the economy, urbanisation of the population, technological developments available throughout the food and fibre chain, and changing public perceptions and demands in relation to food and health, resource security, the environment and animal welfare (Doering 1995).

All colleges are engaged in the struggle to balance access, financial realities, and scholastic standards. Industry, government and even academia seek employees that are adequately broad in training, have multidisciplinary expertise, are flexible, oriented towards teamwork and have excellent communication skills. Student recruitment, retention and bridging programmes are designed to attract students of high academic ability, accepting that these will have diverse backgrounds, points of view and goals. Individual staff members with differing faculty appointment types in research, teaching, and/or extension, face new issues on how to fund and develop relevant programmes. It is realised in the LGC system that every citizen in some way participates in the formulation of public policies that impact on agriculture and that it is essential for the public to link what they pay for and require of food and the effectiveness of agricultural education and research. Some courses and outreach education are being developed to serve beyond a narrowly defined agricultural student body.

System-wide coordination and synergies

While education, research and extension are linked in each LGC, the three functions are diverging where each adapts to different external and internal demands and incentives. Research and extension synergies with teaching are maintained only with conscious effort, and are rendered unlikely if there is institutional separation. Undergraduate courses are designed to provide students with experience in developing depth in at least one area of knowledge and skills. Having access to research and educational outreach practitioners enhances both learning and attitude. Graduate programmes increasingly cross disciplinary, departmental, divisional and institutional boundaries. The fact that LGCs are an interconnected system paves the way to expanding the range of courses available while maintaining on-campus expertise. This occurs through articulation agreements, distance learning shareware, joint programmes, and exchange arrangements.

Food and fibre animal industries have social and technical peculiarities that require special attention. The education and extension programmes at large key LGCs have several common characteristics. They offer more than one type of degree, and need to satisfy students seeking subjects or majors in agricultural animal management, pre-veterinary animal science, and agribusiness. Student internships, research and industry attachments, and internships with cooperative extension provide experiential education.

Australia: universality and locality

We face the same challenges as the LGC system and seem to be positing similar solutions, though we start from different historical positions in the Australian States. The small size and competitive nature of the now large number of Australian universities is a constraint. We have not been a coordinated system. Amalgamations have provided increased size but not removed tensions of culture and resource use patterns. The separation of the powers, responsibilities and commitments among different types of institutions operating in a given locality and industry has been an isolating force. Increasing overlap of areas of interest and service between State Departments responsible for agriculture and natural resource areas and 'other agencies with the universities needs to be resolved positively. We are coming down in favour of a cross-institutional integrating system, producing synergy rather than competition. Most agricultural education and research programmes that range from molecular level to agribusiness complexity are too costly to favour replication. Vocational training needs to be seen as a complementary and not an alternative system. This underlies the drive for credit transfer programmes in a framework of consistency and predictability relating to admission and advanced standing processes.

The future approach will inevitably be subject to constant adaptation to changing industry requirements, funding mechanisms and new visions. We need outreach to be closely attuned to these, to develop appropriate and timely responses from the composite education, research and extension system. Interaction between institutions is critical, and a regional ethos plus a global capability is essential. As among the LGCs, there will need to be specialisation and perhaps the "sense of place" will help define that. There will need to be a negotiated division of labour within institutions and with their affiliates in terms of teaching, research and outreach functions. Sense of ownership at staff level should be reinforced through clear position descriptions and a target-setting protocol.

Victoria We see the changes now being instituted as progressing in three waves.

1. the linking of vocational college and university programmes;
2. the merging of extension activities conducted by State departments with educational outreach activities;
3. the uniting of research (basic, strategic and applied), education and extension through merging non-regulatory functions of State departments with those of universities engaged in agricultural education.

The merging of vocational and higher education frameworks has commenced. High quality short vocational and longer higher educational courses will be linked through a single agricultural and related education provider. Courses are being restructured to better serve career opportunities. Subjects and learning modules are being re-developed with an eye to their contribution in life-long learning programmes and usefulness to other institutions. Affinities and interactions with other institutions in teaching are being strengthened. Sensible and effective routes for progression between levels are being developed through credit transfers and bridging programmes, but a basic tenet is that we maintain the disciplinary strengths.

Industry development for research and extension involves shared strategic planning with the State Department of Agriculture, Energy and Minerals. Faculty Industry Groups have been set up across departments and with representation beyond the Faculty in areas of essential programme delivery. For Victoria these include dairy, ruminant meat, wool and pig industries. The charge to Industry Groups encompasses outreach, research and educational activities. Staff appointments, including adjunct appointments, will proceed with clear terms of types of appointment as in the LGCs, and dual appointments will require different emphases in staff appraisals.

CASE STUDY 2: HAWKESBURY'S LEARNING SYSTEMS APPROACH

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Development is primarily a learning process - one group cannot develop another, the only type of development possible is self- development - Russell Ackoff (1990)

History tells us that predictions of what animal industries will be like 10 years hence are notoriously poor. Thus the end of education and extension services are not known, and without these, means can be

rendered irrelevant. Therefore, rather than engaging in discussion based on the premise of a means-end design and planning, we see a need to move to an organic, critical learning system model for both education and extension services. Such a system allows planning for possible future scenarios, but it is a process approach that readily responds to changing needs.

The theme of this session itself is a reflection of the dominant view that the function of education and extension was the delivery of services which meet the customers' demand. These customers are generally assumed to be a homogenous and definable group - students in formal and informal settings for education and farmers in the case of extension. It is also assumed that the needs can be defined and understood by other people external to the situation before effective delivery can be organised and offered, often through a centralised system. This is a detached, positivist and technocentric view.

The approach discussed here takes a constructivist rather than a positivist view of the world. We see research, extension and education as all being different aspects of the one process of learning. Rather than consider the students or farmers *per se* as our customers, we prefer to see all designers and participants of educational programmes, policy makers and funding agencies, farmers, consumers and industry, not as customers, but as stakeholders, some close and others more distant. Ours is a contextual approach, which recognises the need to respect different points of view and act in inclusive, participative ways. The Hawkesbury approach is a critical learning system, where educators, students and other stakeholders behave as a community of learners, learning together from real-world experiences. Systems thinking and practice are used explicitly, both as a framework for developing the curriculum and to guide learners to their way through complex agricultural situations. Continual critical reflection about the learning process itself is another foundation of the approach.

The Hawkesbury approach

What we do in this world is a function of the way we see it, and thus, to improve the way of doing things, we need firstly to change the way we go about seeing (Bawden 1991, 1992). The curricular reforms we introduced in 1978 saw agricultural education as concerned with the interface between people and their environment. We believed we needed to (a) deal with complex issues as wholes rather than immediately reducing them into component parts (systems thinking); and (b) be explicit about how we learn to do this (experiential learning). Our programmes today range from Diploma to Doctoral levels, but all are informed by these ideas. The Bachelor Degree in Systems Agriculture, reviewed and re-accredited in 1994, typifies the Hawkesbury approach.

The degree programme is made up of three year-long phases with an optional fourth year for an Honours degree. Learning is designed to take place through a series of real life, rather than just theoretical situations, with increasing complexity as the student progresses through the three phases. Phase 1 emphasises farming as a human activity system, provides the learner with an ecological framework for understanding agro-ecosystems and the tools required for the analysis of a farming system, such as the University's commercial dairy farm. These prepare the student for Phase 2, where much of the semester is spent living on a host farm somewhere in NSW. Ideally, the student and the host family explore the farm situation collaboratively, and the student presents a multi-perspective analysis of the farm and its enterprises, and proposes strategies to improve key issues identified collaboratively during the study.

From the middle of Phase 2, the student is encouraged to undertake career-directed projects, with client(s) who often represent an agricultural organisation. The project and the methodology to be adopted are chosen in consultation with a staff member, and are in the learner's area of interest. Their understanding of the situation, as well as the actions taken to improve (used in preference to problem solve since there are rarely finite solutions) this situation, contribute to the learner's competency development in their career/interest area. Appropriate electives are selected to build technical knowledge and competence. Assessment is focussed on three core competencies: autonomous learning, systems thinking and effective communication. Claims of learning and competency development are validated by clients, staff and other appropriate resource people. Staff act as role models for students by operating in teams to present subjects, work with groups of students as either discipline specialists or as facilitators of learning. Finally, staff provide critical feedback to students and assess their readiness to progress or graduate. Assessment panels include external evaluators representing the industry relevant to the graduating students' projects/career area.

Some recent examples of issue-based learning projects undertaken by Phase 3 students in the animal production area include the evaluation of three different strategies for oestrus synchronisation of heifers in a large dairy herd, testing of a commercial feed supplement for farmed deer in terms of its protein quality, reviewing broiler management practices of a commercial farmer and evaluation of four different calf rearing systems for a local dairy farmer. The students concerned had chosen the respective areas for a future career, and in all cases identified the client themselves, negotiated the project, obtained outside assistance where necessary and concluded their projects with a professionally prepared document. A further project is elaborated here to illustrate the learning outcomes and situation improvement. The project addressed the issue of managing the kangaroo population around stock watering points and the student concerned developed the project collaboratively with the Ivanhoe Landcare Group. Various stakeholders concerned with sustainable management of domestic stock and kangaroos in the rangelands participated in developing an ethically defensible strategy for controlled culling of kangaroos. The student's role was that of a consultant to the group and a facilitator of group processes involved in agreeing on strategies, field testing and their eventual implementation. Apart from a satisfactory outcome for the client group, the student's own development of professional competencies is substantial.

Despite some early scepticism, the educational community in Australia and overseas has recognised the relevance and value of the Hawkesbury approach. The evidence for this comes from the addition of these ideas to varying degrees elsewhere, and the number of consultancy requests being received. In 1984, the US Department of Agriculture, through a National Curriculum Project, incorporated the essence of our approach into a text book (Wilson and Morren 1990). Through UNESCO, Ford Foundation, Kellogg Foundation, the Asian Development and World Banks and others, the ideas have been used in many educational settings in Australia and abroad. In 1994, the Bachelor programme was presented as a case study for life-long learning by the HEC/AVCC project on *The enabling characters of Undergraduate Education.* Ison (1994) concluded that what had occurred at Hawkesbury had irrevocably changed the lives of a large and growing number of people. There will always be perturbations in the environment. Hawkesbury hopes to continue-to respond to these events in order to create better futures for agriculture.

CASE STUDY 3: CUSTOMER DEMANDS FOR EXTENSION SERVICE IN 10 YEARS

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Customers of agricultural extension services have traditionally been primary producers; however, over the next 10 years, we are likely to see a broadening of the customer base. Other sectors of industry will become involved by demanding services or being targeted by extension agencies as they move towards a more market-driven focus.

As well as a change in customer mix, there are some strong indications that the following pressures will change the nature of the service required:

- environmental concerns - demand for advice on the environmental consequences of production technology will increase as society generally becomes more concerned about the environment;
- holistic advice - the need to integrate production technology and sustainable natural resource management with farm viability and the goals of the producer;
- market focus - there is an increasing awareness of the importance of product quality and satisfying consumer needs;
- animal welfare - the change in community expectations about the care and management of livestock.

Service characteristics to meet customer demands

With the expanding customer base and complexity of the service demanded, no single extension service will be able to meet the needs. Rather, we will need a large number of private and government extension agencies providing specialist services.

Transition: from current to future services

The following discussion on transition is viewed from the perspective of a government extension service repositioning where it operates in the marketplace. There are several pressures on government which will drive this transition:

- as the relative importance of agriculture, as perceived by the community and government, declines, so does the share of government budgets allocated to agriculture;
- in response to reduced budgets governments will allocate dollars to those areas of greatest perceived public (and/or political) benefit. These areas will tend to be environmental, public health and safety, welfare and areas of significant economic benefit;
- there is reluctance by governments throughout Australia to intervene in areas where the market is capable of delivering desired outcomes;
- increasingly, extension is being seen not as a service to farmers but as a policy tool by which governments can achieve change through educational processes.

Framework for evaluating government services

In 1993, economic, policy and strategy consultants were commissioned by the Premier to review the NSW Department of Agriculture's role and functions (ACIL 1993). The consultants developed a framework to assist with decision making on where the Department should be involved. This framework poses several questions:

- Is there a prima facie case of market failure? (Would someone else provide the service if the Department was not there?).

If yes,
- Are the costs of the market failure significant?
- Can the problem be treated at its source? eg unmasking market signals.

If no,
- What type of intervention is justified? eg regulation, extension.
- Is it appropriate for the NSW Department of Agriculture to do it and if so, who should pay?

By applying this model, we can identify those areas in which the Department should be involved and those which can be transferred to the private sector.

Pilot projects

In response to this review, the NSW Department of Agriculture has embarked on several pilot extension programmes in partnership with the private sector. Although the Department has for many years undertaken programmes in partnership with the private sector which have been production orientated, these recent pilot projects have an emphasis on the delivery of services.

Example 1 In a partnership programme with a rural merchandising organisation, there is a cooperative approach to crop management extension. In this particular pilot project the Department is endeavouring to be the provider of information which is then disseminated by the private sector extension network (this organisation has 17 agronomists in the pilot area compared with NSW Department of Agriculture's 7). Planning meetings are held 3 times a year to identify the major cropping issues, develop strategies for collecting information on solutions to the problems and issues, and to plan the extension strategy for the delivery of the information to farmer clients.

Example 2 In response to an approach from a private organisation, the NSW Department of Agriculture is providing crop and livestock extension services on a fully commercial basis to clients of that company. The local agent for the company organises groups of clients and then engages the appropriate extension staff to provide technical information to the groups. The information provided is restricted to technical and management aspects. Extension officers do not endorse or promote the use of products. This is however the role of the local agent who endeavours to sell product around the service provided by the Department of Agriculture's extension staff. These services are paid for by the company. Additional information and follow up services are provided by extension staff through the local agent.

Advantages of partnership approach with the private sector

The advantages of the two approaches outlined above are:

1. government is working with the private sector rather than in direct competition;
2. an improved service to farmers from the combined expertise of the private sector and the NSW Department of Agriculture. NSW Department of Agriculture is also providing training to the private sector;

3. the impact of the NSW Department of Agriculture's programmes will be multiplied manyfold by disseminating information through a large number of commercial outlets. It is estimated that there are over 200 outlets selling agricultural inputs/services and approximately 500 professionally qualified private consultants/sales advisers supporting agricultural industries in NSW. This number is growing steadily;
4. it will provide a structure for the NSW Department of Agriculture to phase out of those areas where the private sector has or is developing the expertise. The anticipated market driven transfer of extension staff from the public to private sector will ensure an ongoing service to farmers, and minimise trauma to staff.

In summary, by working with the private sector we can maintain services to agriculture while gradually transferring to the private sector responsibility for those services where the market can deliver the desired outcomes.

CASE STUDY 4: LOCAL BEST PRACTICE IN CENTRAL QUEENSLAND

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In central and northern Queensland a network of local beef producer groups is systematically identifying and evaluating new management practices using "critical performance measures". These outcomes have been enabled by a methodology of participatory problem solving called "Local Best Practices" (LBP) (Clark and Filet 1994; Clark 1995a; 1995b). The methodology has been developed over seven years of research into how to develop and improve sustainable beef production systems. It involves:

1. forming and working with a network of local self-selected teams of producers committed to taking action to improve management practices;
2. enabling LBP groups to use their knowledge and experience to describe and document current best management practices;
3. enabling LBP groups to use the document (benchmark) of current knowledge and perceptions of best practices as a tool to develop questions (opportunities) about how to improve practices;
4. enabling LBP groups to address 8 critical components (Figure 1) of problem-solving (opportunity-testing) with appropriate techniques, specialists and information sources.

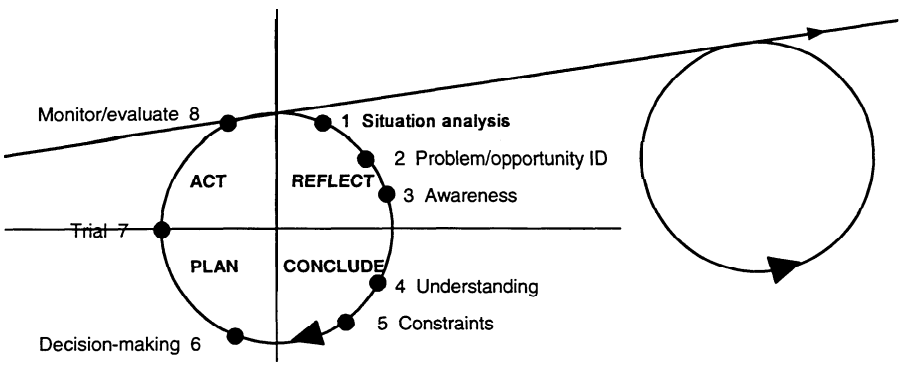

Figure 1. A model for Participatory Problem Solving of complex issues. The model identifies 8 "critical components" of problem solving and places these at phases of the Experiential Learning Cycle

This "on-going on-site learning" has resulted in continuous improvement in practices. The most dramatic results of this investment in extension "process" are demonstrated by results in Kunwarara Best Practices Group (60 km north of Rockhampton) which has members from seven local properties.

Individual producers in this group have improved steer growth rates by 60 kg/hd in one year; they have also increased cow reproduction rates from 80% to 92%. These improvements have increased gross margins by $6/hd up to $15/hd. (There are 630,000 hd in the black speargrass country). These improvements in practices were achieved with a local investment of $8000 through the Meat Research Corporation's Producer Initiated Research and Development programme in LBP process. Local RD&E support has enabled this change to occur.

Customer demands for education/extension in IO years

Significant trends in extension for the next ten years are:

- reducing public expenditure on extension;
- increasing emphasis on achieving outcomes (change in practices);
- increasing emphasis on efficacy and efficiency of extension resource use;
- more equitable access and delivery of services;
- greater emphasis on self-reliance;
- producers will be more aware of what specific services they need and will contract these.

The term "producer self-reliance" often appears in the goals of RD&E managers. This term needs clear definition if processes are to be designed to achieve it. Coffey and Clark (1995) consider that self-reliance is best described as an interdependent relationship between producers and other agents rather than a state of independency or dependency. Clark (1995) has defined self-reliance in terms of producers "being motivated and skilled to identify problems, access appropriate information and services, and solve problems".

To capitalise on these trends and to become more self-reliant customers will need:

- skills in problem-solving, particularly problem identification (generating questions)
- skills in learning-how-to-learn (formulating questions)
- access to relevant information systems
- skills and power (networks) to negotiate services.

Service characteristics to meet customer demands

Services will be characterised by:

- a willingness to participate with clients in the development and design of services;
- processes designed to enable producers and their services agents to identify priority problems/opportunities (do a situation analysis);
- processes to enable/skill producers (and their service agents) to learn as fast as possible (learning how to learn);
- processes to enable producers to identify what information they need and to access relevant information;
- processes to enable producers to contribute to the management of services.

The concept of "process" needs to be agreed on before processes can be designed/developed/researched. For this paper process is defined as a series of methods/techniques/tools/activities/skills/information which, when sequenced, will achieve desired outcomes.

Transition from current to future services

In order to meet future needs service agencies will need to obtain the necessary resources (human and financial) and skills to:

- monitor trends and needs;
- conduct "futuring" processes to develop on-going strategies;
- design extension processes that are efficient and effective;
- place more emphasis on skill-transfer as opposed to knowledge-transfer;
- set up processes which are genuinely participative with joint decision-making about RD&E services;
- set up processes which are responsive to the needs of (self-reliant) local groups actively practising action learning and generating questions that need answering;
- develop information technology in association with effective and efficient learning systems.

DISCUSSION

There is a tension evident in the changes foreshadowed by the case studies on extension and education for the animal industries. On the one hand there is increasing market demand for novel specialised services in a competitive environment, clearly linked to specific client needs. On the other

hand there is an institution-driven move towards greater integration and co-operation within and between institutions and agencies to optimise use of people and resources and provide the flexibility required for industry support in areas of research, education and extension. The broader holistic learning approaches advocated by Sriskandarajah *et al.* or described by Clark in his Local Best Practice beg questions as to who should initiate and provide such a facilitative service, who pays, and how this fits with market demands for specialised segmented services. How are stakeholders encouraged to participate; is coverage of all the major stakeholders important; and if so, who is responsible for ensuring sufficient coverage?

The case studies (particularly Egan and Falvey, and Hartley) note the likely emergence of strategic alliances between previously independent functions of education, extension, research, and private sector activities. Achieving synergy between differing groups requires process skills in managing change and aligning different cultures. It assumes an appreciation of the skills of other groups where there has traditionally been discontinuity or occasionally friction; for example, between research and extension, between government extension and private sector advice, or between university and vocational education. Many individuals will require new skills, particularly in communication, negotiation, and evaluation. Learning opportunities to support their participation must be available to established professionals, new members of rural interest groups, producers and private sector personnel.

The development of a range of approaches which reflect the multiple problems, stakeholders and perspectives brings a requirement to provide data to various stakeholders, so that they can make judgements about the efficacy and efficiency of different approaches, and make choices about allocating their scarce resources - for example, of time, energy, money between processes and between problems. Is it enough to argue (as Sriskandarajah *et al.* do) that complex problems do not have solutions but should be viewed as opportunities to learn through a problem, when a stakeholder's initial decision to participate often depends on a sense that certain goals will be achieved within a nominated time frame? Where governments are involved the application of resources to a problem must be accountable in terms of outcomes. Similarly, if industry or individuals are to contract services they must be confident at least that required short term outcomes will be achieved. It follows that one of the challenges for future extension and education will be the development and application of rigorous and efficient needs assessment and evaluation processes to enable individuals or groups of participants to choose or design the most applicable approach. This implies that institutions, agencies and industries are clear about some of the outcomes they want, and are confident that proposed processes will achieve them.

While the underpinning philosophy may be one of lifelong learning, most of us evaluate our experiences by the hour, the day, and the week. Learning and collaboration have benefits and also costs; they compete with other ways of doing things, and will attract participants and capture resources only if there are measurable returns to the personal or institutional investment of time and money. The challenge for educationalists and extensionists is to manage processes which will enhance learning and collaboration; these are the preconditions to the future competitiveness and sustainability of animal industries.

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