HOW UNIVERSITIES CAN FUNCTION TO FILL AN EMERGING KNOWLEDGE AND SKILLS GAP IN AGRICULTURAL INDUSTRIES

Abstract:

This paper discusses an example of an innovative approach to community engagement undertaken by the Tasmanian Institute of Agricultural Science (TIAR), a partnership between the University of Tasmania, the Tasmanian Government, and rural industries in Tasmania. TIAR is a research, development and extension agency. As a consequence of the withdrawal of government services over recent decades, an information vacuum relating to basic production systems has emerged in sections of the agricultural community. This paper argues that there is a place for institutions such as universities to undertake programs to bridge this gap, and thereby contribute to the ongoing competitiveness of Australian agriculture and the viability and vitality of rural communities. One example of this is TIAR's 8x5 Wool Profit Program which seeks to act as an information source that is reliable, independent, and encourages the adoption of technologies and practices that will enhance producer productivity and profitability. It does this by developing an effective learning environment and culture between TIAR, wool growers and service providers. The findings from an evaluation of 8x5WPP suggest that universities can effect real change at this level. This research reveals how a program can be implemented so that it engages the other players in the information and knowledge system by complementing and engaging with private service providers. University involvement in this area is not suggested as a replacement or direct competitor to private sector interests. It does suggest though that there are roles that universities can undertake that could resolve service gaps that have emerged where there is no immediate private sector benefit from investment. International examples of how other university systems deliver RD&E programs are also discussed.

Key words: *Agricultural extension, farming community engagement, change agents, drought, community vitality.*

Paper Type: *Responding to the needs of the region/community.*

Introduction

In Australia, the role of universities has largely been confined to traditional parameters of research and learning. This paper argues that universities have both an obligation, as well as a unique capacity to spread knowledge, promote learning and build social capital in rural industries and their communities. It discusses how universities have the potential to fill service provision gaps where there is either private or public sector failure to provide such services. These industries would see their members benefit not only via productivity improvements but also from other "public good" avenues. The paper also suggests that universities can be non-partisan organisations that can negotiate partnerships and meld economic and social sustainability in regional Australia.

University professionals understand the concepts of research and development. Their familiarity with the science of extension, however, is probably less robust. Röling (1988: 49) describes extension as *"A professional communication intervention deployed by an institution to induce change in voluntary behaviours with a presumed public or collective utility"*.

The State Extension Leaders Network (SELN 2006: 3) has described extension in the rural sector as:

> *"the process of enabling change in individuals, communities and industries involved with primary industries and natural resource management (NRM). Extension is concerned with building capacity for change through improved communication and information flow between industry, agency and community stakeholders. Extension seeks outcomes of capacity building and resilience in individuals and communities. Extension contributes to protecting, maintaining and enhancing the landscapes, livelihoods and lifestyles of all Australians".*

Whichever definition is chosen, the nature of extension is that it moves hand-in-hand with research or so it should. Unfortunately, for a range of reasons, extension has become separated from R&D.

This paper discusses an example of an innovative approach to community engagement undertaken by the Tasmanian Institute of Agricultural Science (TIAR), a partnership between the University of Tasmania, the Tasmanian Government, and rural industries in Tasmania. As a consequence of the withdrawal of government services over recent decades, an information vacuum relating to basic production systems has emerged in sections of the agricultural community. This paper argues that there is a place for institutions such as universities to undertake programs to bridge this gap, and thereby contribute to the ongoing competitiveness of Australian agriculture and the viability and vitality of rural communities.

Changes in Australian and New Zealand agricultural RD&E provision

As a percentage of total expenditure on R&D in Australia, investment in agricultural RD&E has declined from 20% in 1982 to around 8% in 2003 (Mullen 2007). Agricultural research intensity can be measured as the investment in R&D relative to the size of agricultural GDP. Agricultural RD&E intensity grew strongly in the 1950s and 1960s. However, it has been drifting down from about 5% of GDP per annum in the period 1978–86 to just over 3% pa in 2003 (Mullen 2007). Agricultural RD&E in Australia has traditionally been dominated by the public sector. The share of agricultural RD&E undertaken by the various state governments collectively had declined from a little over 50% in past decades to 44% in 2003. The same survey showed evidence that more research is being undertaken by universities and the private sector, and less by state and Australian government organisations (Mullen 2007). The private sector has generally been responsible for less than 10% of total agricultural R&D, although its share in 2003 was 14% (Mullen 2007). Universities are responsible for around 15% and the Commonwealth around 28% of total RD&E investment.

Although a research provider, Universities have rarely been significant players in the extension field. Some institutions have provided training in contemporary extension methodologies and skills to both undergraduates and post-graduate rural professionals over the last 15-20 years, although this is in decline. The majority of university R,D&E efforts have principally been in the pure science disciplines, dealing with high-level R&D. There are limited examples in Australia or New Zealand where universities can demonstrate models that incorporate the entire RD&E process.

There has been a steady retreat from the use of public funds for Australian agricultural RD&E, especially by State governments. The creation of the Rural Development Corporations (RDCs) and Cooperative Research Centres (CRCs) by the Australian government in the 1990s saw a shift from purely public investment to a joint public-industry investment paradigm for agricultural RD&E. Because of the cost-shifting, the overall level of investment has been in decline. Arguably, private sector investment has not expanded at a rate that would compensate for public sector withdrawals.

Gradual policy change in the 1990s has seen State departments of agriculture subjected to a process of review and restructuring that has affected the nature of the services they are prepared to provide, and the ways those services are provided. Governments have defended the need for change with calls for greater efficiency and effectiveness of services provided by the public sector (Vanclay 1994, Vanclay & Lawrence 1995, Marsh & Pannell 1999, Coutts *et al.* 2005).

The trend towards privatisation also appears related to factors such as the declining relative importance of agriculture in the economy and budget pressures on governments, as well as the increasing influence of economic rationalist ideologies within government (Botha & Coutts 2006; Connolly 2004). As detailed by many commentators including Marsh & Pannell (1999), Vanclay (2003), and Vanclay & Lawrence (1995), policies have included:

- regionalisation;

- implementation of the "Funder-Purchaser-Provider" model within some state government agencies;
- industry partnerships;
- cost-recovery;
- cost-sharing;
- out-sourcing and;
- a re-direction of extension activities.

The result of these initiatives has been increased private sector participation in the delivery of agricultural extension services. As a function of this, Marsh and Pannell (1999) observed that there had been a weakening of research/extension links in Australian agriculture. There has been a loss of feedback from farmers to researchers and this has become a problem as state public-sector agencies cut back on production-oriented extension. The problem is worsened by the lack of processes to obtain private-sector feedback to public-sector researchers (Hunt & Coutts 2008).

Stone (2005) also found that there is a discontinuity between research and development providers and the front line private consultants. Stone draws on work by Fulton *et al.* (2002) to indicate that public extension was 'retreating' and that extension was largely being undertaken by private providers – but that there was insufficient incentive for them to fully move into the gap between research and landholders. Ozor *et al.* (2007) claim that market forces ensure the provision of services where there are immediate private good characteristics. Hence, the expectation of past public policymakers that the private sector would meet the needs of agricultural industries and their communities was probably over-ambitious.

Similar trends to the Australian situation have also been observed in New Zealand. In 2007 Botha *et al.* conducted a study to understand the role that agricultural consultants in New Zealand were undertaking in the RD&E system, in particular in relation to environmental extension. New Zealand does not have a public extension service having privatised its agricultural extension services in 1987. Hence, there is a strong reliance on consultants and regional councils for environmental management information and advice. Because they are independent of the formal RD&E system, there is no guarantee that RD&E outcomes are reaching farmers, nor that effective environmental extension is occurring. The study found that agricultural consultants are playing an important role in working with farmers to improve agricultural production. There are, however, indications that gaps have developed over time between agricultural consultants and the agricultural research sector which therefore limit the effectiveness of the RD&E system. Agricultural consultants are playing a minimal role in pro-active environmental extension because of insufficient market forces in driving this role.

It would appear that a more coordinated approach is needed to better and more systematically involve agricultural consultants in the RD&E system in New Zealand. The research shows that consultants do have (real and sometimes perceived) time limitations in seeking out training opportunities and the volume of information available through print and internet makes it difficult for them to sift through and determine key messages and information relevant to their clients (Botha *et al.* 2007).

The investigators suggested a national database of agricultural consultants could improve the flow of tailored information between research and agricultural consultants and also suggested mechanisms where consultants could be better integrated into the RD&E system and provide feedback to research programs. Importantly, market failure in the area of environmental extension could be addressed by publicly funded incentive programs.

Is agricultural RD&E investment good value for money?

Mullen (2007) states that agricultural RD&E in Australia has yielded productivity improvements of approximately 2% annually. In the period from 1918 to 2003, public and private RD&E in agriculture realised an internal rate of return of around 15% with a greater than 8:1 benefit-cost ratio. Mullen goes on to say that while productivity growth has remained high, public investment in agricultural RD&E in Australia has been static for two decades (at around $700m in 2004 dollars) and research intensity has declined. Meanwhile, the research sector has continued to evolve both in terms of where investments are made and how they are managed. ABS statistics also reveal a shift in research resources to plant industries and away from animal industries. The increasing importance of funding through RDCs and CRCs may mean that a greater proportion of research investment is of an applied nature, boosting productivity growth in the short run, but perhaps at the expense of growth in the longer term. Hence the fiscal savings for State government on one hand may be advantageous, but the future opportunities for growth from agriculture could be compromised.

There is an apparent disconnection in rural industries that has emerged with the decline of State agricultural RD&E investments. Thus, a window of opportunity has evolved for increased independent institutional involvement in developing and delivering integrated RD&E outcomes for rural Australia.

Local and international models of University RD&E in rural industries

There are a number of models where universities actively and successfully engage agricultural industries and rural and regional communities in RD&E programs. The following two models are provided as examples that have had considerable impact:

Australia – The McKinnon Project
Based at the University of Melbourne's Veterinary School at Werribee on the outskirts of Melbourne, the McKinnon Project is a recognised leader in sheep and beef consultancy both in Australia and internationally. The McKinnon Project was established in 1982 with the specific aim of improving the productivity and profitability of sheep flocks and beef herds. The McKinnon Project's core functions include education, research and whole farm consultancy for the extensive livestock industries. McKinnon has been involved with investigations into the live sheep export business, as well as various productivity programs funded by the animal industry RDCs. The project also offers consultancy services to agribusiness. It has been instrumental in establishing new scientific findings related to livestock production, and cementing in place new production doctrines via their extension-consultancy efforts. Larsen *et al*. (2002) in their work with Australian wool growers felt that McKinnon has been able to successfully develop participatory models of research that identified important problems and research priorities. They have been able to establish strong linkages between researchers, program consultants and innovative farmers. As a consequence they were able to deliver properly designed and relevant research and extension packages that improved the profitability of participants. McKinnon has proven to be a sustainable program that has been for the most part revenue positive. McKinnon's presence has ensured the retention and availability of high-level intellectual property to the Southern Australian animal industries by maintaining a small highly-skilled multi-disciplinary team. It has played a vital role in keeping production system knowledge alive and up to date (Counsell pers. comm. 2008).

United States of America – Cooperative State Research, Education and Extension Service:
In the United States, university engagement in RD&E activities in rural and regional communities is the norm as opposed to the exception. The United States Department of Agriculture has over 100 colleges and universities involved in its Cooperative State Research, Education and Extension Service (also known as the *Land Grant* system). Despite the sharp decline in the size and economic importance of rural America since the inception of the scheme in 1914, the National Cooperative Extension System remains an important player in American life. It has adapted to changing times and landscapes, and it continues to address a wide range of agricultural industry and community needs in rural and regional areas.

The institutions carry out RD&E works in six major areas:

- Youth Development — cultivating important life skills in youth and equipping youth to make appropriate life and career choices.
- Agriculture — research and educational programs to advance rural industry productivity and diversification.
- Leadership Development — training extension professionals and volunteers to deliver programs in agricultural industry and community settings.
- Natural Resources — extending awareness and understanding to landowners and home owners about natural resource stewardship.
- Family and Consumer Sciences — helping families become resilient and healthy by teaching nutrition, food preparation skills, positive child care, family communication, financial management, and health care strategies, and;
- Community and Economic Development — helping local governments investigate and create viable options for economic and community development (USDA 2008).

Röling (1988) observed that the US Cooperative Extension System integrates the functions of teaching, training, extension and research. Since its origins, the scheme was not only seen as a means of delivering new applied knowledge to farmers but also for transmitting their interests to the university research community – thus retaining an action-research learning model within their RD&E system. The extension agents were not just educators or disseminators of research, they performed many other tasks such as facilitators, motivators, capacity builders, skills teachers, counsellors, and public relations. The US system has been highly successful contributing strongly to the rate of technical change in agriculture.

TIAR is presently adopting a RD&E service model in the dairy and vegetable industries that is somewhat akin to the US Cooperative model. The Tasmanian State government has paid the University of Tasmania (UTAS) to take over these former assets. From mid-2007 UTAS via TIAR now has an integrated RD&E capability in agriculture independent of government. These programs will also be supported by external industry funds. Discussions are under way to take the remaining DPIW agriculture activity areas (broad-acre, beef, sheep and wool) into TIAR.

Building regional learning communities

To add further credence to the idea that universities have a prospective role in this area, Kilpatrick *et al*. (2006) suggest that regional universities can add to local sustainability via bringing an RD&E capacity to their home locations that might be rarely available through other mechanisms. University initiated research projects conducted locally can provide an opportunity for regional communities to examine their practices through a different lens. Through these projects, researchers in regional universities are able to connect their region to national and global contexts. To be able to do this, university researchers must be able to establish and maintain effective relationships with regional stakeholders, ie. bodies that fund research, research participants and/or research partners. Kilpatrick *et al*. advocate for the development of learning communities regionally. They define learning communities as being made up of people who share a common purpose. They collaborate to draw on individual strengths, respect a variety of perspectives, and actively promote learning opportunities. The outcomes are the creation of a vibrant, synergistic environment, enhanced potential for all members, and the possibility that new knowledge will be created.

Universities logically can become key agents in regionally-based learning communities and as such bear a resemblance to the United States Cooperative State Research, Education and Extension model. They can build on sharing the available expertise from within the community as well as collaborating with people and groups external to the community. Through this they can introduce new ideas, raise awareness of new practices and expose members to new norms and value sets (Kilpatrick *et al*. 2006).

A case study of the Tasmanian 8x5 Wool Profit Program – a local university program affecting change in rural industry

Introduction

This case study reports on an evaluation of the impact of introducing a range of extension approaches into the wool growing regions of Tasmania, a location which has experienced minimal state government support for extension for more than 15 years. Since 2003 funded by Australian Wool Innovation Ltd, the 8X5 Wool Profit Program has been undertaken by the Tasmanian Institute of Agricultural Research at the University of Tasmania. The extension approaches included the establishment of grower groups, workshops, demonstrations and newsletters in a coordinated program. The research interest lay in learning of the value of these different approaches towards developing and maintaining sustainable sheep and wool production systems. The research methodology involved evaluating change according to Bennett's hierarchy (Bennett 1975). Techniques used for the evaluation included surveys of participants from respective industry segments and analysis of relevant secondary information and data.

Background

Tasmania has a reputation as a producer of some of the world's finest quality apparel wools. It contributes around AUD $70m – $90m of revenue to the state annually. The Tasmanian wool industry comprises around 850 commercial wool growers with a sheep population normally around 3.5 million representing around 4% of the national flock. Some 40% of the state flock yields highly sort after fine to superfine wool of less than 18.5 micron. Sheep numbers have declined through the ongoing 2006-08 drought with an estimated population of around 2.9 million in mid-2007. In Tasmania, public policy decisions have facilitated the steady withdrawal of government services to Tasmanian sheep and wool growers over the last 15 years, and this has led to a significant information vacuum amongst producers.

In 2003 Australian Wool Innovation Ltd (AWI), funded the Tasmanian Institute of Agricultural Research (TIAR) to conduct an extension program to service AWI levy payers in the state. The project is in its second phase. The first phase was a mix of RD&E programs. The current second phase is entirely extension focussed.

TIAR has principally been a research and development agency working on discreet project initiatives for various Tasmanian agricultural industries. Now it finds itself as a leading extension agency filling an apparent information vacuum within an industry that has been under serviced for over a decade (Hunt & Coutts 2008).

The following table details the respective groupings, activities and materials that were under evaluation in late 2007. It spells out the segmentation of stakeholders and the respective activities and or means of engagement within the program.

Table 1. Program groupings & activities
Source: Coutts (2007)

Industry non-active producers (600 businesses) This grouping is defined by persons who do not actively participate in 8x5WPP forums, workshops, or group activities; and do not receive electronic monthly newsletters. Their only contact with the program is via quarterly hardcopy newsletters through the mail or wider media coverage. Engagement: ▪ *Quarterly printed newsletter* ▪ *Mass media*
Tasmanian rural industry service sector (160 persons) The service sector is constituted by members of the media, wool-brokers, agricultural consultants, agribusiness sales representatives, local government, State departmental officers, rural counselling services, the University of Tasmania and church patrol padres. Engagement: ▪ *Monthly electronic newsletter & other electronic bulletins* ▪ *Mass media* ▪ *Attendance of field days & workshops*
Industry-active (250 businesses) This grouping is defined by persons who are not 8x5WPP group members but may receive monthly 8x5 WPP electronic newsletters or participate in 8x5WPP forums or workshops. They are at a higher level of engagement than non-active producers, but do not get the more substantial learning opportunities that group members do. Engagement: ▪ *Quarterly printed newsletter* ▪ *Monthly electronic newsletter & other electronic bulletins* ▪ *Attendance of field days & workshops* ▪ *Mass media*
Members of 8x5 Groups (8 groups – approx 70 businesses – these are also a subset of the industry active grouping). This grouping is characterised by receiving a high-level service that involves at least four meetings per year. They function around a loose action-learning paradigm. Group members identify relevant needs and program staff assist in delivering those learnings. ▪ *Quarterly printed newsletter* ▪ *Monthly electronic newsletter & other electronic bulletins* ▪ *Self-selecting groups using CI&I process* ▪ *Technical people deliver detail* ▪ *Some groups using trials* ▪ *Field days/workshops* ▪ *Mass media*
Project team Program Advisory Panel (10 members consisting of sheep & wool producers, three university staff and a single State Government agricultural representative)
Secondary information – including surveys, reports and benchmarks undertaken as part of the program and related projects and programs and projects

Findings from the 8x5WPP evaluation

1. Filling the knowledge, understanding and skills gap:
The Coutts (2007) evaluation revealed that there was a universally positive reaction to the 8x5 Project across the industry. There was a widespread feeling that the project had filled a large information and extension gap that had resulted from the Tasmanian Government's continued withdrawal of extension services. Program Advisory Panel members gave the program a good report card in the key areas of reliability, independence and association with new technologies.

A number of comments were made about 8x5 filling the gap left by the withdrawal of the previous government extension services … *when the department left, stuff fell through the cracks*. The 8x5 Program was seen by many as having filled this gap. There were good examples of where the program has linked to services provided by private consultancy groups (eg. financial benchmarking services). Growers working in groups saw opportunities to cut through the information glut and be exposed to the core locally relevant information. A number saw the groups as a *catalyst* prompting them to follow-up information from other sources based on what was covered in group meetings and events (Hunt & Coutts 2008).

2. Making an impact:
Within the program, 8x5 group members (65%), industry-active (53%) and service-sector (65%) survey respondents indicated that one of the biggest impacts of their involvement in the workshops or programs was improved technical or management skills. 8x5 group members and service sector respondents however saw even more impact (70%) with improved information seeking skills. There was a strong expectation by group members that knowledge and skills gained would lead to improved productivity and profits (Hunt & Coutts 2008).

Early indications are that the 8x5 program is successfully prompting future and current practice changes by 8x5 group members, industry-active and the service sector. Eighty percent of 8x5 group members who participated in the survey indicated that they had made some changes in management approaches or practices. This is almost 30% more than industry-active people where just over half (53%) said that they had made changes (Hunt & Coutts 2008). Collectively these represent significant extension change achievements.

One of the major forms of knowledge distribution is through the 8x5 monthly and quarterly newsletters. Its major aim is to update producers and keep them informed with the latest management and industry knowledge. A variety of topics including animal health, nutrition, drought strategies, pests, fertility have been covered. In addition to these articles, useful website links covering information such as climate change and upcoming events were also included (in most newsletters). The 8x5 newsletter has had quite a high impact on practice change by industry-active and 8x5 group members. In general, almost all industry-active respondents (97%) indicated that they have used the learnings from the newsletter to improve their background knowledge (Hunt & Coutts 2008).

The *Industry non-active group,* however, do not seem to be overly impacted by the 8x5 program beyond the general knowledge factor. Survey respondents were not prompted to take much action as a result of the newsletters or media articles and stories. Only 13% indicated that they read the information and improved their background knowledge or attended a field day or workshop. This reinforces the difference outcomes for passive and active participants of the program.

The service sector particularly mentioned the program's impact on their information seeking skills. One respondent said: *"The availability of resources is great and it is good to have access to the advisors – from a community perspective".* Comments were also made about how the program has increased their awareness of current industry issues. The role of change *catalyst* emerges again, along with the inference to the program delivering a net public benefit in the community.

Coutts' investigations showed that there are already clear practice changes at the farm and industry level as a direct result of the establishment of 8x5 groups. This has included such things as the uptake of drought-lotting, improved pasture management, strategic spraying of

pasture grubs and benchmarking. The different level of impact demonstrated that active participation in groups and/or events was critical to producers taking resultant action – in this case the newsletter provided information support and direction for practice change. Information on its own had a much lower impact, although it did prompt some people to join groups and attend events (Coutts 2007). There was also evidence that these practice changes were already leading to productivity gains amongst group members and those who attended 8x5 events. Examples included: significant increases in lambing percentages; improvements in stock and pasture condition (eg: decreased degradation as a result of drought-lotting) (Coutts 2007). The underlying message is that members more actively engaged in the program generally had a greater increase of knowledge and increased propensity to affect change as opposed to those who were only passively engaged (Coutts 2007).

3. Developing community vitality:
The research revealed improved social interaction and networking (*sense of community or vitality*). The service sector placed a high value on the contribution of the project to the Tasmanian industry. This was also reflected in the PAP assessment that 8x5WPP was having a positive impact on the industry.

Coutts identified that personal gains mostly revolved around networking and interaction with other growers and the opportunity to share knowledge and ideas. They valued the chance to see that they were not the only one facing a particular problem. The feel of community with each other was a real personal benefit for group members. One respondent said that their gain was in the *"involvement and interaction with people in similar situations sharing ideas".* This was also reflected strongly in the group debriefs where the main reason given why the growers joined a group was to take up an opportunity to interact with a group of 'switched-on' other growers – *to pick the brains of locals*. The groups were primarily seen as a rare, focused opportunity to hear what other growers were doing on their place.

This was echoed by the surveyed industry-active people who most mentioned the social impacts of meeting and talking with others, sharing ideas, issues and solutions and networking. One respondent said that *"Interacting with other locals has been the most beneficial part of the whole thing – seeing what everyone else is doing".* Hence, the program also appears to be acting as a *catalyst* in the generation of social capital in the rural communities where it is functioning. 8x5WPP is being seen very much as a catalyst in the area of learning, on-farm practice change and creation of local social capital (Hunt & Coutts 2008).

Discussion

The 8x5WPP is an example of how a university-based independent extension program has been able to engage and commence to bridge an apparent knowledge and skills gap in a rural industry. Interventions such as 8x5WPP question whether pure market forces necessarily meet collective industry needs for innovation or widespread adoption of technologies that ensure collective and ongoing industry competitiveness and sustainability. Alone, market forces within the private sector may not be enough to assist an industry to make certain technical adoption or strategic systems changes along a value chain that it needs to remain internationally competitive or environmentally sustainable. As it is, it appears that even some of the private sector service providers are seeking to be engaged with 8x5WPP as a means of learning about production system fundamentals. The service-sector also welcomes the unique types of client engagement opportunities that 8x5WPP offers them, something they might not be normally be able to achieve.

A window of opportunity exists for Australian universities to build relevant learning communities within their regions. The 8x5WPP case study indicates that universities can undertake efficacious roles in rural industry service provision. They are (relatively) unfettered by government policy sensitivities and can operate more flexibly. Additionally they are viewed as independent, and hence their advice and recommendations are not contaminated by perceived commercial bias or public sector political correctness. In the Tasmanian situation, there has emerged a sense of cynicism of the State Government Department of Primary Industry and Water (DPIW) as many producers working with 8x5WPP had felt that they had previously been

abandoned by DPIW. Unfortunately, government policy has seen DPIW subject to serious operational restrictions that were targeted at encouraging a growth in private sector agriculture service provision for some years. The private sector did emerge to some extent (ie. with retired DPIW staff working in consultancy roles etc.), but the evidence is that in the sheep and wool sector there has been a level of market failure in meeting all of the industry's needs. Therefore, the maintenance of 8x5WPP as an independent, responsive and reliable provider of information, and facilitator of change has given 8x5WPP and the University of Tasmania credibility and capacity to influence change.

Vanclay & Lawrence (1995) discussed how new RD&E institutional arrangements and frameworks were necessary to affect environmental sustainability for agricultural production systems in Australia. Universities can position themselves for such a role. Critical thinking of how universities might enter into a negotiation process with Federal and State governments, RDCs, CRCs and agri-political bodies for future agricultural RD&E needs to be considered. Does this happen individually or on a competitive basis? Is there a prospect of a cooperative alliance of universities for leveraging an outcome in the way agricultural RD&E and possibly other services (eg. rural health or youth programs) could be delivered nationally? What are the benefits in being more closely aligned to "real-world" rural industry and community situations and should such a business direction be taken? Where do opportunities exist? These questions remain unanswered.

Universities have historically had an episodic association with rural industry at the upper end of R&D hierarchy as needs dictated. The concept of universities getting "down and dirty" in the field of extension provision in rural and regional Australia is almost a foreign concept. Yet, this is where we must go if universities are to provide meaningful services to prospective clients, as well as to provide important feedback on learnings and future R&D directions to research elements. Research, extension and clients cannot operate independently of each other in the long-term. We must begin to think as learning communities.

Conclusions

In Australia and New Zealand there has been a downgrading of agricultural RD&E in recent decades that has led to a fragmentation of communication between researchers, extensionists and end-users. A system must be found to reconnect the discipline areas and end-users in a way that provides effective service delivery as well as meaningful feedback on programs and needs. The case study of the 8x5 Wool Profit Program in Tasmania indicated that there is an emerging knowledge and skills gap in some agricultural industries. This has been a function of public sector withdrawal and market failure in regard to the private sector meeting all the needs of agricultural industries and their communities. Australian agricultural industries and the nation that benefits from their collective production output are currently living off the benefits of past intellectual investments in agricultural RD&E. From one perspective, there is a business opportunity for the university sector. From a moral point of view, universities are independent centres of expertise that can contribute significantly to rural and regional Australia and should be lobbying to take their leadership role in the aforementioned areas. Australia needs to maintain a farmer-level skills base and rural community cohesion that can cope with challenges such as climate change and assume a level of preparedness for future food security. Universities can and should be leaders in this area. Investment in Australian agriculture has, and continues to be good value for money.

The opportunity exists for universities to become increasingly engaged as RD&E service providers to agricultural industries via both industry and public sector funding arrangements. However, program investment should not necessarily cease at agricultural RD&E service provision. In many of Australia's far-flung rural communities, government social services are notably conspicuous by their absence. Universities are centres of excellence that could also be harnessed to deliver specific socially orientated programs for net "public good" benefits. The alternative to further investigating this idea is that we continue to live on our past intellectual capital investments and risk becoming less competitive internationally, and potentially become less secure in our own food resources. We suggest therefore that there is a strong case for innovation.

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Biosketch

Warren Hunt is the Coordinator of the 8x5 Wool Profit Program and is based with TIAR at Mt Pleasant Laboratories in Launceston, Tasmania. Email address: warren.hunt@utas.edu.au

Professor Frank Vanclay is a Rural Sociologist with the University of Tasmania in Hobart, Tasmania. Email: Frank.Vanclay@utas.edu.au

Dr Jeff Coutts is a private consultant in extension and program evaluation based in Toowoomba, Queensland. Email: jeff@couttsjr.com.au