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Creating the Cicerone Project: seeking closer engagement between livestock producers, research and extension

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Abstract. A unique project led by livestock producers, called the Cicerone Project, was undertaken on the Northern Tablelands region of New South Wales, Australia, following acknowledgement by those producers of a widening gap between them and research and extension information. The overall aim of the project was to co-learn, through a partnership between livestock producers, research, extension and other specialists, how to improve the profitability and sustainability of grazing enterprises in that region. It was hypothesised that closer engagement would help to guide relevant research efforts and also enhance the adoption of research findings. With the support of industry funding and the collaboration of key research, education and extension partners, the inaugural steering committee of the Cicerone Project commissioned a survey of over 300 land managers in the region to explore their research and adoption needs. The survey identified the most important issues and found a high level of commitment to the formation of this producer-led project. Negotiations between all collaborators led to the creation of a Business Plan prepared as the basis for an initial funding period of 5 years. Subsequent reviews of the project allowed for extensions with associated activities over an additional 4 years. In order to study the key farm management alternatives identified from the producer survey, the Cicerone Project Board decided to adopt an agricultural ecosystem approach which conducted studies using three whole-farmlet systems. The farmlet experiment compared three contiguous farmlets by measuring as many aspects of the farm systems as possible using an approach summarised in the motto adopted by the Cicerone Project of 'compare–measure–learn–adopt'. A wide range of field days and seminars were held over the duration of the project to deliver the results to the producer members. This paper provides an introduction to a Special Issue containing 24 papers which report on the entirety of the project from planning, to execution, results, and reflections on the value obtained from the many research and extension activities, with particular emphasis on the farming systems trial conducted between 2000 and 2006.

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Introduction

Over the past several decades there have been many who have noted the challenges of conducting research which is not only seen as relevant by farmers but also results in adoption of findings. By the 1990s, this issue had the attention of the then Wool Research and Development Corporation, which supported an 'action research' project by Ison (2000) and colleagues in the Western Division of New South Wales (NSW). They explored the 'so-called "failure of graziers to adopt technology", which had been developed by research funded partly with their money' and discovered the great value that was realised when graziers were listened to and became closely engaged in project activities.

In the USA, the value of including farmers in the 'research design' phase had been recognised by Lightfoot and Barker (1986). Again in the USA, Watkins (1990) reported that farmers do not appreciate being passive recipients of results from research identified and investigated largely by scientists with little input from farmers. He recommended a more participatory approach, termed 'Farmers-First-and-Last' where farmers worked with research and extension experts to determine priorities, conduct investigations and help in delivering results.

Edwards *et al*. (1993) recognised the need for research and development relating to agricultural sustainability to encourage a multi-disciplinary approach involving farmers, preferably at a whole-farm level. However, in a review of projects in the USA, which had attempted to address 'sustainable agriculture', Anderson and Lockeretz (1992) found that many had been of insufficient scope to adequately address such a broad and complex issue.

In southern Australia, French (1995) suggested that cooperative efforts between farmer groups and teams of soil scientists and agronomists were needed in order to solve complex cropping systems issues, by conducting multi-factor research in farmers' paddocks to deliver solutions using an integrated systems approach. In Queensland, a similar approach was endorsed by Carberry (2001) who found that participatory action research in cropping systems was an

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approach that could deliver credibility and relevance. However, he also pointed out some of the difficulties which can be encountered such as: 'the high time cost of participation, a reliance on qualitative data, unfamiliar data analysis techniques, poorly appreciated evaluation procedures, publication barriers and a lack of career and reward structures' (for participating scientists).

In the case of livestock enterprises, a focus on inter-disciplinary investigations was found to be useful in western Victoria by Vizard and Foot (1993) who pointed out the complex challenges of balancing pasture and animal needs. Their experiences suggested an 'integrated approach to the animal/pasture partnership is necessary to ensure the long-term economic stability of the pasture-based grazing industries'.

It seems that, at least where livestock producers are not closely engaged in locally relevant research, there can be a substantial 'disconnect' between those managing the land and the research findings published in scientific journals. It is worth noting that the reasons for this 'disconnect' do not all lie with researchers and extension specialists. We suggest that at times, livestock producers can be somewhat insular when they focus too much on their own farm, and may not enthusiastically engage with research and extension activities in the region. This observation is supported by Trompf and Sale (2006) in Victoria, where they found that, unless agencies actively recruited participation, less than 6% of producers took part in extension activities. No doubt, for some wool producers, this may be because many may find themselves overcommitted with an increasingly busy work schedule.

The scepticism on the part of some farmers may also be affected by the commercial nature of much information on offer today, with its inherent vested interests, through numerous promotional brochures, newsletters, advertisements, etc., often based on anecdotal evidence. Thus, the current expansion of 'farmer-driven research' activities in Australia could be argued as evidence that traditional research methodologies and institutions are less relevant today (Carberry 2001).

Further, and importantly for farmers' economic viability, we suggest that at times advice fails to sufficiently take into account the risk or satisfactorily explain the costs of adopting new technologies compared with continuing with familiar, traditional practices.

Two notable conclusions from the recent national Sustainable Grazing Systems (SGS) research and adoption program across southern Australia were that producers need to be 'in control of research and development to maximise learning and on-ground change' (Andrew 2003) and that they benefited from interactions with others especially in a 'non-threatening environment'. The SGS Project reported that producer participation before, during and after the project was recognised as vital to achieving practice change and the project reinforced an increasing interest in producer involvement in research and adoption relating to grazing enterprises (Simpson *et al*. 2003).

However, while the Northern Tablelands of NSW was 1 of the 11 regions within the SGS regional producer extension network, there was a feeling by some graziers in the region that they were excluded from the major areas of study as the region did not contain a research site; nor did they feel that they were in control of the research as claimed above. In fact, when the SGS Project ceased, the close link that had been developed between researchers, extension workers and livestock producers in the project was severed in most regions leading to a sense of frustration expressed by members of the former Northern Tablelands SGS Regional Producer group. It was with this background that the Cicerone Project came about on the Northern Tablelands of NSW.

On the Northern Tablelands, livestock production systems are generally extensive, with graziers managing large numbers of animals on farms with an average area of 920 ha (Alford *et al*. 2003), a variable, summer-dominant rainfall which averages ~780 mm per annum, and low minimum temperatures in winter (Fig. 1). As in the past, livestock producers in this region continue to be challenged by the dual risks of climate and commodity price fluctuations. However, today, they are also faced with the need to ensure that any impacts on the natural resources of land and vegetation are benign. Thus, there is an ongoing need for continuing high quality and relevant research that encourages, where appropriate, rapid adoption of useful findings.

It is noteworthy that considerable research has been conducted over many decades on the Northern Tablelands. Just a few of the past studies relevant to today's livestock producers, but of which many may be unaware, include the discovery of the concentration of nutrients in localised sheep camps (Hilder 1964), widespread soil deficiencies of phosphorus and sulfur in the region (Spencer and Barrow 1963), the effects of fertiliser and grazing management on preventing pasture degradation (Cook *et al*. 1978), the relationship between intestinal worm control and grazing systems (Barger 1996), and the value of remote sensing of pastures (Vickery *et al*. 1997). It is interesting to note that during the planning phase of the Cicerone Project, no one anticipated that several of these issues would be re-visited within the Cicerone farmlet experiment, albeit within a 'whole-farm' context.

It appeared that findings from the recent national research described above warranted further investigation under locally relevant conditions in order to create an opportunity for increased adoption of the important conclusions relating to profitability and sustainability. During workshops held in the planning process for the Cicerone Project, livestock producers agreed that there was a wealth of underutilised or unutilised research and also noted that little had been conducted within the whole-farm context that is so relevant to them. This perception of insufficient adoption of past research findings was a major catalyst for the formation of the Cicerone Project.

As pointed out by Northern Tablelands grazier, Gordon Williams, management of whole farms is not much concerned with single issues. He described management of his farm 'Eastlake', as attempting to 'balance some 45 management balls in the air' at any one time (15 financial; 14 land management; 16 stock/crop activities) (Williams 1994). For example, adjusting one factor such as stocking rate could not be seen in isolation from many other factors, some of which might include worm control, pasture establishment, the price of fertiliser and debt levels. According to Williams (1994), the increasing interest from many graziers in what he termed 'prescriptive' solutions to farm management, such as 'cell' (Savory and

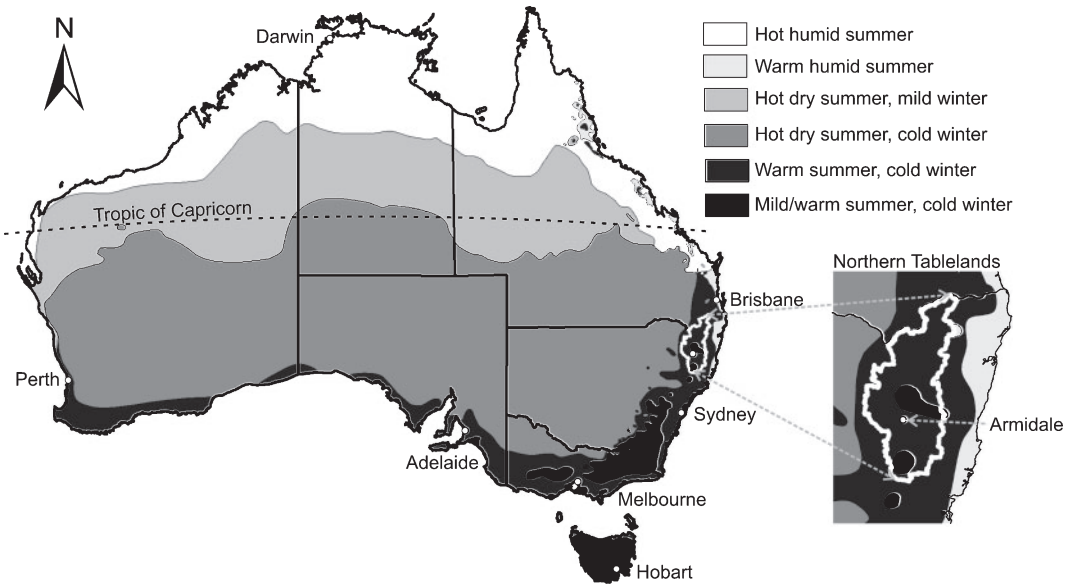

Fig. 1. Map of Australia showing climatic zones based on temperature and humidity with detail of the location of the Northern Tablelands and Armidale, NSW (map adapted, with permission, from Bureau of Meteorology 2012).

Parsons 1980) or 'time control' (McCosker 2000) grazing, which claim the ability to raise stocking rates while reducing fertiliser applications, is of concern. The answer, he suggested, was for researchers, educators and graziers to work towards an improved multi-disciplinary understanding of pasture ecology and livestock management.

In order to address the need for improved understanding of such complex systems, this project evolved in a way that reflects, in part, the history of research on the Northern Tablelands and especially the farming systems investigations of past researchers at both the CSIRO experiment station 'Chiswick' and the University of New England. For example, much of the early research into agricultural ecosystems was developed in the mid 1950s at the newly proclaimed University of New England, by Bill McClymont, the inaugural Chair of Rural Science, whose central theme was to explore, through teaching and research, the 'manipulation of (the) soil–water–plant–animal complex for (the) purpose of economic production of animal products' (Southcott and Bindon 1996).

At the time the Cicerone Project commenced, several potential collaborating partners had experienced declining funds for their pasture and livestock research. In common with other parts of Australia, the capacity to conduct research in the area of livestock, soils and pastures had declined dramatically over recent decades (Lowe 2007) and the earlier opportunity for individual farm visits by government extension agency staff had changed to one of training farmers in groups. At the same time, the influence of private consultants and of agri-business had been increasing leading to a situation where the complexity of farming systems investigations was being recognised as a problem for farmer–scientist partnerships across Australia (Ridley 2005).

This paper presents an overview of this producer-led project which has explored, together with scientific investigations of system components and interactions, the practical realities of producing animal products in a way which is financially viable and yet environmentally sustainable.

The overall hypotheses of the Cicerone Project were (1) that livestock producers will be more likely to adopt research if they are able to participate more in the research-adoption process, including in identifying the research problems; and (2) that those scientists working more closely with producers will help to ensure greater relevance of research to end users.

Project methodology

The challenge of meeting many goals simultaneously in any grazing enterprise influenced the design of the Cicerone Project so that researchers and extension specialists alike would be confronted with a similar array of complex issues that today's graziers are faced with as they manage their whole farms. It was a particular interest of producer members that trials should be conducted at a 'commercial scale' such as recommended by Kemp *et al*. (2000) following the large national Temperate Pasture Sustainability Key Program conducted in the high rainfall zone of southern Australia.

The Cicerone Project began in 1997 at a meeting of ~45 graziers, researchers, extension workers and agribusiness representatives held at CSIRO's field research laboratory, 'Chiswick'. This meeting resolved to form a producer-led steering committee, under the chairmanship of grazier Mr Hugh Sutherland, with representatives from CSIRO, the University of New England and NSW Agriculture. The name 'Cicerone' was chosen to imply a learning culture as embraced by the historic Roman orator, teacher and mentor, Cicero, who communicated that 'natural law' encourages people to work for the benefit of society at large.

With the financial support of the International Wool Secretariat, the steering committee commissioned a survey of over 300 local landholders to learn of their research and adoption

needs (Kaine *et al*. 2013). The desire of producers to be involved in the project was strongly confirmed by the survey, with some 170 respondents expressing interest in becoming members of the proposed Cicerone Project (Kaine *et al*. 2013). Some of the key issues which arose from the survey and which subsequently influenced planning included: the importance of fertiliser and grazing management on pasture persistence, especially through drought, sheep feeding and management of the pasture feed supply, including supplementary feeding, to maintain ewes in 3-score condition and the management of internal parasites of sheep.

Having determined that the project concept was well supported and having gathered the opinions of livestock producers of the region concerning the key issues to be explored, the interim Cicerone Board chose the following as the initial aims of the Cicerone Project:

(1) Create an environment in which researchers and producers could learn from each other and create new knowledge for the benefit of Northern Tablelands agriculture,
(2) Undertake training and increase awareness by conducting field days and skills workshops on topics determined by the project stakeholders,
(3) Provide access to a central farm, which would facilitate the uptake of research from trials and comparisons under commercial conditions, and
(4) Provide information, by means of newsletters and other media, of importance to Northern Tablelands farmers.

During deliberations of the best model to adopt for enhancing interaction with livestock producers, especially relating to Aims 1 and 3, several options were considered. The first option considered was of a 'model' or demonstration farm, managed by a producer/research/extension group incorporating a single, complete farming system. However, a 'model' farm, such as those developed previously by NSW Agriculture at Bega and Kyogle (W. McDonald, pers. comm.), was considered of limited value as it would be restricted to only one type of management system which would not allow comparisons of management systems (Clark 2010). As the Cicerone Project had decided that it wanted to compare and measure different systems, this meant that the model farm concept was not appropriate to the task.

A network of focus or benchmarked farms was also considered. If these were to be used, it was acknowledged that key measurement data would be needed before and following the adoption of any systems under trial so that realistic comparisons could be made. Benchmarking field days could be held to enable all participants to learn from the comparisons. However, this option was considered to be premature as there were no management systems agreed by members to be worthy of adoption at this early stage of the project.

The third option considered and, finally adopted, was that of comparing different farmlets, each incorporating a different management system of interest to Cicerone members. These would also allow field days and skill enhancement days to be held on them as well as having the involvement of producer members in their design and management.

The list of problems identified both through the survey of livestock producers (Kaine *et al*. 2013) and confirmed at a subsequent meeting of Cicerone members suggested that graziers wanted solutions to problems in areas such as: profitability, levels of inputs, pasture persistence and composition, worm control and grazing systems.

It was agreed that the project should not aim to work on everything; rather, the important principles should be the main target of investigations. Soil types needed to be relevant to the district. The scale of the investigations was also considered to be important as, if it were to be too small, the results would be less credible in the eyes of members. However, this did not mean that whole farms had to be the units of investigation as, necessarily, farms differ in their soil type, topography, rainfall, etc. and therefore are difficult to compare.

It was proposed that the environmental impact of any changes in practices needed to be understood and quantified so that farmers and the community could be confident in knowing that the effects had been measured. Farmlet comparisons were thought to be particularly important as many livestock producers were not well aware of how their own farm business performed relative to others and hence the measurement of the performance of different but relevant systems would allow conclusions to be drawn by those farmers involved.

It was agreed that the project needed to gain wide acceptance from the regional farming community. To help encourage participation, it was agreed that the project needed to enfranchise as many producers as possible. Thus, any investigations of technologies needed to be done within a range of farming systems, at least one of which most producers could readily relate to as a typical 'control' farm system.

Communication events that were planned included part- or whole-day field days, usually initiated and run on-farm or on a research/demonstration site by research or extension workers to explain data and/or principles to producers.

Although there was some interest in 'high input' systems, it was agreed that approaches that might be termed 'low input–low risk' might also be evaluated, especially in relation to profitability. It was decided that the farming systems to be evaluated needed to encompass the whole system including aspects relating to soil, plant, animal, financial, society, environment, risk and management. In short, the hope expressed at the outset was that the 'art' of managing complex farming systems might be better understood through comparison and measurement of different whole-farmlet systems. More details on the design of and guidelines for running the farmlet systems trial are given in a related paper (Scott *et al*. 2013).

The Cicerone Project was carried out largely within the 227 ha of land leased from CSIRO on the field research property 'Chiswick', 17 km south of Armidale, NSW. This property is known widely in the region as having had a history of long-term, inter-disciplinary research. Early workers in the then CSIR, such as Dick Roe, were vitally interested in ecological approaches to research investigating the continuum from climate to soils, pastures and animals, as interacting factors in whole-farm systems (Southcott 1997). Roe also wanted research to be done with 'due regard being paid to the economics of land use in all its aspects' (Hutchinson 1997). A later Officer in Charge of CSIRO's 'Chiswick' research station, Bill Willoughby, was committed to exploring the grazing

ecosystem as a '. . .study of the whole system, based on climate-soil-plant and grazing animal, as the essential experimental unit' (Hutchinson 1997).

The issue of funding, both initially, during and near the end of the project was always a significant issue that consumed enormous time and effort from both project staff and in-kind contributions from Cicerone Board members.

The financial support for the Cicerone Project was allocated in stages. The first stage supported the steering committee and the commissioning of the survey of graziers. The funding body's (International Wool Secretariat – IWS) program managers agreed that this project had entered 'uncharted waters' as it was the first time that IWS had funded a group to explore what it might do.

Upon approval of the Business Plan, a 5-year budget was agreed on, but it was clear that this was committed to support the aims of the producer-led project and its two part-time staff members, and was not intended to support all of the research and adoption activities envisaged in the ambitious Plan. The project also received support through annual subscriptions (less than $100 p.a.) paid by members of the Cicerone Project.

Wherever possible, attempts were made to leverage funds from other sources. For example, because of the potential implications of the farmlet research for the production of meat and timber and the potential off-site implications on catchments, co-funding proposals were put to the Meat Research Committee (MRC) (for sheep and beef-related investigations), the Rural Industries Research and Development Corporation (for agroforestry investigations) and the Land and Water Resources Research and Development Corporation (for land and water investigations).

Whereas the initial requests to these bodies were not successful, several other requests for funding were forthcoming during the trials as Producer Initiated Research and Development grants from the MRC, one postgraduate scholarship from the University of New England and two postgraduate scholarships from the Australian Sheep Industry Cooperative Research Centre. A research project which proposed to measure the environmental components of the farmlet trial submitted to two funding bodies was unsuccessful.

Because of the unusually large scale of field measurements envisaged in the farmlet experiment, permission was sought and granted from the funding body (IWS) for income earned from the farmlets (from sale of wool, meat, animals, etc.) to be returned to the project to help support the costs of managing the farmlets. This allowed the farmlet trial to operate at a larger scale than traditional experiments as these funds were sufficient to support the part-time farm manager's salary.

In the last year of the project, an integrated request for funds for a second phase project, named 'Cicerone 2: improving environmental and whole-farm outcomes', was put to a wide array of funding bodies and four Catchment Management Boards in whose territories Cicerone members owned properties. Unfortunately, this proposal was unsuccessful and so, following support of a final 'harvest year' by Australian Wool Innovation, during which results were extended to several other districts (Edwards *et al*. 2013), the project wound up in early 2007.

Stages of approval/review of project

- 1997: interim approval was given for the project following the election of a Steering Committee, which commissioned a survey and carried out initial planning.
- 1998: the project was approved for 5 years following the approval of a Business Plan. The initial full Cicerone Board was elected in mid 1998.
- 2002: a review was conducted following a change in the management of Australian Wool Innovation; it recommended continuation.
- 2004: a second review of the project was conducted which recommended a 2-year extension.
- 2005: approval was given for a 'harvest year' to enable the writing up and delivery of findings collected up to October 2006.

Business Plan

The elements of the approved Business Plan are summarised briefly in Box 1 (Anon. 1998).

The Cicerone Project was set up as an independent, incorporated, not-for-profit body, run for the benefits of investors and financial members. It was controlled by a Board of Management which represented the interests and expertise within the fields of land management, research, extension, education and business. This expertise was derived from livestock producers and at various times, from representatives of Landcare, NSW Agriculture, CSIRO, Tertiary and Further Education NSW, the University of New England and private consultants. While commercial support was encouraged for individual projects and activities, the overall project was not linked to any single commercial organisation. The Board was legally responsible for the project including execution of the Business Plan as well as financial and employment matters.

Two key appointments were made at the beginning of the project: the Executive Officer (with a background in farming, research and extension) and a Farm Manager for the farmlet experiment (with technical training and an imaginative and practical approach to farm management).

It was decided that the central farm would be different to a typical 'institutional' research farm. It was to be guided by producer-led research, development and extension leading to real changes in adoption. There was to be no bureaucratic, top-heavy administration, although it was acknowledged that an appropriate level of administration would be required.

As part of the Business Plan, a benefit-cost assessment was carried out, which showed that the Northern Tablelands is a major Australian region for pasture-based production of meat and wool, comprising four Rural Lands Protection Boards of Armidale, Glen Innes, Tenterfield and Inverell. The area supported more than 4 million sheep and almost 700 000 cattle with an average property size of 540 ha. Examples of possible benefits and costs were given in relation to two potential solutions to identified problems: in the case of worm resistance, increasing the adoption of improved worm control strategies by 10% could result in an annual return of some $350 000 to the region whereas, increasing the persistence of sown pastures from 8 to 15 years could result in a saving of 19% of the net present value of the cost of pasture renovation.

Box 1. Business Plan for the Cicerone Project

Project objectives:

(1) Undertake a series of field days and skills workshops, open to all interested parties, in all aspects of land use, production, marketing and financial management with a target of four field days and four workshops per year complemented by a newsletter to be produced four times per year.
(2) Cultivate and assist the creation of four new research projects to be closely associated with the Cicerone Project within the first 3 years.
(3) Design and create a central farm, which meets the research and extension needs of the project members with key features of measurement, comparison (research) and learning.
(4) Increase awareness among the participating groups of each other's interests and activities and involve scientists in the practical aspects of agricultural production and land management.
(5) Have six network farms involved in research and 200 producer members by the end of the third year of the project.
(6) Conduct a farm benchmark study to assess the natural resources, financial status and other appropriate and quantifiable performance indicators of a sample of farmer members.

The product arising from the project was a service to:

(1) Create a learning environment in which researchers and producers can learn from each other and create new knowledge for the benefit of Northern Tablelands agriculture.
(2) Undertake training and increase awareness by conducting field days and skills workshops on topics determined by the project stakeholders.
(3) Provide access to a central farm, which will facilitate the uptake of research by trials and comparisons under commercial conditions.
(4) Provide information, by means of newsletters and other media, of importance to Northern Tablelands farmers.

Discussion and conclusions

While it is premature in this introductory paper to declare the hypotheses posed earlier as proven, it is nevertheless clear that the case for more involvement by livestock producers within the research-development-adoption continuum was indeed compelling for members of the Cicerone Project. The early interest by more than 100 potential members representing land holdings of some 100 000 ha on the Northern Tablelands suggested that the impact of the project was likely to be high.

It appears also that the motto adopted by the Cicerone Project of 'compare–measure–learn–adopt' has been most appropriate, just as the old adage 'if you can't measure it, you can't manage it' appears to ring true once again. This is borne out by Bywater (1990) who pointed out that technology transfer regarding farming systems issues has been hampered in most systems trials due to the lack of 'hard, objective and quantitative explanations of why the system worked or did not work'. Further, he noted that the science of whole-farm experimentation was 'woefully undeveloped' as attempts had hitherto failed to take into account sufficiently the 'dynamic interaction of components within systems with sufficient rigour'. It is our view that, from the beginning of this project, the majority of participants favoured an approach to knowledge discovery about farming system performance and interactions based on objective measurement so that the results would be seen by the intended beneficiaries of the project, the livestock producers of the region, to be credible.

Adult learning was an important component of the Cicerone Project. The approach taken was reminiscent of the long-held principle espoused in this region by the Warden of the then New England University College (later the University of New England), Dr Robert Madgwick, who wrote in 1938: 'if adult education were to succeed it must start by finding out what people were interested in, and then starting out to satisfy their interests' (Ryan 1996). Others too have sought ways to enhance adult learning about complex farming practices, which often require a systems view be taken in order to bring about understanding. For example, Bawden (1990) reflected on the significant influence of Colin Spedding in the UK who had long argued for the need to understand 'whole agricultural systems'. In Australia, Bawden and colleagues (e.g. Dillon 1976) explored agricultural systems, both in research and teaching, at the University of New England. Later, Bawden *et al*. (1984) described the experiential learning concepts developed at the University of Western Sydney in which students were encouraged to learn about the whole-farming system before exploring more fundamental, 'reductionist' components of technologies.

In Queensland, Frank (1997) had urged research, development and extension personnel to involve farmers as part of new approaches to understanding farming systems using an agro-ecological approach. It turns out that, at the time that Cicerone was negotiating its approach to co-learning, other parallel developments were occurring in other sectors within Australia. For example, Crawford *et al*. (2007) developed innovation learning partnerships with commercial dairy farms across different Australian States to address issues of complexity in agricultural innovation. They pointed out the need for 'active

negotiation of learning roles between farmers, researchers and advisors'.

As there is an ever-changing population of livestock producers within any region, there is an ongoing need to maintain awareness of past findings as well as to extend the latest research. New ideas and approaches are continually promoted to the farming community, many by those with vested interests in the technologies being recommended; thus it is important that livestock producers are supported with access to objective sources of information.

We note that, at least on the Northern Tablelands of NSW, most livestock producers do not participate in any form of benchmarking and hence are unaware of their performance relative to other producers in the region. Science may well recommend that the adoption of a particular practice might lift production or reduce costs but, in the absence of measurements of their farm system, producers are commonly not in a position to make quantifiable comparisons and this suppresses the likelihood of adoption of many recommended practices. It is also acknowledged that it is difficult for individual farmers to measure their farm performance. That is why it is so important that objective measurements are made of different farm systems in a way that trusted information can be provided to members.

Publishing the findings of this broad, complex and ambitious project has been a challenging and lengthy process, having commenced back in 1997. It is reassuring to know that this road has also been travelled by others, in parallel, as noted by Tanaka *et al*. (2008) in the case of integrated crop/livestock research. In their paper, they described the numerous challenges of conducting systems research, including issues such as: the need for scale, experimental design compromises between treatments and replication resulting in difficulties with statistical analyses, funding and other resource limitations, the need for teams with multi-disciplinary skills, successfully publishing findings and ensuring the relevance of the experiment to producers' needs.

In view of the material reviewed above, and the outcomes of the development phase of the Cicerone Project, it became clear that several features needed to be incorporated in the project if it were to succeed. These included a desire to see that livestock producers should help to determine the research priorities, in order to increase the level of interest in project activities. Further, in recognition of the complexity and size of livestock farming enterprises in the region, wherever feasible, investigations should be conducted at a scale considered relevant by commercial livestock producers. The adult learning aspects of the project were also seen to be an important component – not only for producers but also for research and extension participants – especially where differences between systems could be established through objective measurement. Finally, producers sought real 'ownership' of the project and were keen to take on a leadership role beyond what has typically been achieved in other projects through participation or consultation.

The result was a research–extension–adoption partnership that was truly 'producer-led'. Apart from decisions of the funding bodies which supported the project, all decisions were taken by the Board on behalf of the not-for-profit organisation itself, with no control ceded to any of its partners. Although all Board members had input into the decision making, given that livestock producers formed the majority of the Board and also held the position of Chairperson, this project was quite different to previous models of collaboration.

In this paper, it is not appropriate that we attempt to summarise the issues covered in the other 23 papers in this Special Issue. The reader is invited to explore these papers to learn how the Cicerone Project created an effective solution to the problem of the lack of engagement between livestock producers and scientists. For example, readers will no doubt be interested to learn of the breadth of the project, as well as the research conducted by the postgraduates and other collaborators. For example, the producer-initiated research on virulent footrot, which came about due to the strength of its members' views, led to applied and laboratory research that showed changes were needed in the detection of virulent footrot, leading to the elimination of costly, false positive diagnoses of the disease (Gaden *et al*. 2013).

Regarding the exploration of farming systems issues via the Cicerone farmlet experiment, subsequent papers describe: how the farmlets were planned, the evolution of the experimental guidelines, some of the statistical methodologies used, changes in soil fertility, pasture composition, herbage mass and quality, livestock production and health, remote sensing of the farmlets over time, profit and economic risk, optimisation of technologies, tree growth, extension outcomes and an integrated overview of findings.

The Cicerone Project adopted a unique and comprehensive approach to exploring complex whole-farm management issues of importance to livestock producers that led to many significant findings that are a worthy legacy from an exciting and engaging project for all who came in contact with it. The last paper of this Special Issue (Coventry *et al*. 2013) includes reflections from all participants regarding the degree to which the project satisfied the great expectations held for it. No doubt, both those who participated and the many who were not able to see the project first hand, will continue to benefit from this project's motto of 'compare–measure–learn–adopt' long into the future by reading the results published in this Special Issue.

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