

THE FARM MANAGEMENT PROFESSION IN NEW ZEALAND: WHERE ARE OUR ROOTS?¹

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ABSTRACT

The relevance of agricultural economics to farm management in Australia has come under much criticism over the years. This disaffection with the contribution of agricultural economics to the farm management profession has provoked debate on alternative approaches to farm management decision making, with the search on for alternative disciplinary homes for farm management. The contribution of this paper is to add a New Zealand perspective to the debate.

The farm management profession in New Zealand is considered in its broadest sense, embracing farmers, employers of farm management graduates and teachers of farm management, as well as farm management researchers. A history of New Zealand farm management is presented, followed by a description of the content and conduct of teaching programmes. A brief synopsis of research activity is then catalogued.

This descriptive material is then used to elicit the roots of the farm management profession in New Zealand. The conclusion is reached that farm management practice in New Zealand has been, and remains, completely transdisciplinary, while farm management teaching has been primarily transdisciplinary but also interdisciplinary, whereas research activity has been transdisciplinary, interdisciplinary and disciplinary. The transdisciplinary and interdisciplinary approaches are explored further, challenges associated with them are highlighted, and implications for the contribution of agricultural economics to farm management are considered in this context.

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INTRODUCTION

The relevance of agricultural economics to farm management decision making in Australia has come under much criticism over the years at both AARES Conferences and in published journal articles. In his comprehensive review of fifty years of farm management research in Australia, Malcolm (1990) concluded that much of the academic work in farm management had been neither relevant nor useful in its contribution to theoretical or practical farm management. This sentiment was echoed more recently by Brennan and McCown (2002), who maintained that the economic orientation of much farm management research had led to an increased focus on theoretical and methodological issues that were of less and less relevance to the solution of practical farm management problems. Reasons advanced by these authors for this state of affairs are that individual farms are unique, the farming system is dynamic and complex, issues of uncertainty must be dealt with, and farmers have individual preferences and different multiple goals.

This disaffection with the contribution of agricultural economics to farm management has provoked debate on alternative approaches that could yield greater success in the quest to aid farmers in their decision making, as well as on the role of agricultural economics in these alternative approaches. For example, Brennan and McGown (2002) argue that the interdisciplinary approach of Farming Systems Research has a contribution in this regard, with economists playing their part in an FRS research team. Similarly, Wright (1989) maintained that farm management should be considered a sub-discipline of management, with agricultural economics relegated to a sub-discipline of farm management.

It is not the intention in this paper to traverse this material again with another review. Instead, it is accepted that agricultural economics has provided an incomplete foundation for farmer decision making and that the search is on for alternative and perhaps multiple homes for academic farm management. It is within this context that a New Zealand perspective on 'The Farm Management Profession: Where are our roots?' is considered.

The farm management profession is considered to embrace not only academic farm management researchers but also teachers of farm management in university programmes, employers of farm management graduates and farmers themselves. The focus of this paper is on the contribution that academic farm management teachers and researchers can make to improved decision making by farmers and those servicing the farming community.

In keeping with this broader definition of the farm management profession, a wider perspective will be taken than that of previous reviews, which focussed exclusively on farm management research. A truncated history of farm management in New Zealand is presented, followed by a description of the content and conduct of teaching programmes that cater for the relatively large number of graduates in farm management. A brief synopsis of research activity is then catalogued. This descriptive material is then used to elicit the roots of the farm management profession in New Zealand. The conclusion is reached that farm management practice in New Zealand has been, and remains, transdisciplinary, whereas teaching has been primarily transdisciplinary and interdisciplinary, with research spanning the whole spectrum from disciplinary to interdisciplinary to transdisciplinary. The interdisciplinary and transdisciplinary approaches are explored further, the challenges associated with them are highlighted, and their implications for the contribution of agricultural economics to the farm management profession is considered.

THE FARMING CONTEXT

The farming environment, and the conduct of farm management teaching at Lincoln University in New Zealand within this context, have been described by Pittaway and Plank (1991). The next three sections of this paper draws on and expands their work.

Farm management became recognised in New Zealand as a professional field of study in the 1930's. This situation arose because many farmers, as a result of the Great Depression, found themselves faced with high debt levels that threatened their financial viability. The response of the government was to restructure farm debt through a legal process (The Mortgagor and Leasees Act 1936) that required farms to be valued at a productive valuation based on the capitalised surplus from an annual cash budget for the farm. These 'whole farm' budgets and valuations were then used to establish sustainable mortgage levels for farms troubled by excessive debt. This situation created a demand for professionals who were capable of constructing 'whole farm' budgets that were based on a firm understanding of the physical and financial capability of a farm given its farming policy. Likewise, the study of valuation became intertwined with the study of farm management.

The need for such professionals was further enhanced after the Second World War when returning soldiers were encouraged into farming. In order to comply with the conditions of the soldier settlement schemes, defensible farm budgets had to be constructed in order to establish valuations for the settlement farms.

During the 1950's and 1960's, the New Zealand farming industry expanded rapidly in response to buoyant world markets for its products. This led to an emphasis on the physical development of farms and how to increase profitability through increased inputs, in particular fertiliser, fencing and livestock. Farm Improvement Clubs, which were formed during that period, assisted in this process by providing a vehicle for discussion by farmers and their Farm Management consultant.

During the 1970's and through the early 1980's, the focus in farming was changing yet again. There was still an emphasis on more 'fencing, fertiliser and livestock', but there was also an increasing emphasis on modifications to the existing management system. Systems of rotational grazing were becoming more sophisticated, and feed budgeting was a major tool for managing the winter decline in pasture growth. Farmers were still operating in a low risk business environment, with fixed exchange rates and a wide range of input and output subsidies. The rationale for these subsidies had little to do with rural welfare considerations, but a great deal to do with a belief by policy makers that the economic health of the nation required an agriculture that was profitable and expanding. The combination of low business risk plus a physical environment that had European levels of variability (i.e. winters predictably cool and wet, summers predictably mild and possibly dry, particularly in eastern areas) led to a perspective that farm planning strategies were useful.

Everything changed in the mid-1980's when the then Labour Government abruptly deregulated the New Zealand economy. With subsidies removed, farmers were initially faced with lower and more fluctuating market prices while still having to bear the brunt of high domestic costs and high inflation. Declining profitability, falling land values and interest rates at up to 20% per annum reinforced the need for sound financial and risk management, while the exposure of the farming sector to international markets led to a concern with issues beyond the farm gate.

When the deregulation process was completed in the early 1990's, a farming sector emerged that was characterised by hard-nosed commercialism. Deregulation hastened structural adjustment, leading to a more strategic focus on farm size, competitive advantage and distinctive competence. The removal of subsidies led to an upsurge in entrepreneurial farming activity by some and a reaffirmation by others of their more traditional production focus. As the relative profitability of different industries changed there was considerable enterprise substitution from sheep farming into dairy farming, deer farming, and forestry, and also considerable expansion of the kiwifruit industry. By the end of the 1990s the number of breeding sheep had declined by more than 25%, but due to increased sheep productivity the total lamb meat produced by the industry remained almost unchanged from 15 years earlier.

EMPLOYMENT AVENUES FOR FARM MANAGEMENT GRADUATES

Employment avenues for farm management graduates have varied over the years. Given that a tertiary farm management qualification was set up in response to the needs of the farming sector during the depression, it was not surprising to find that many of the early graduates became involved in debt restructuring and farm supervision. However, there have always been graduates who have chosen to go farming.

Following the Second World War, opportunities for farm management graduates increased, and major employers included a range of government agencies that were associated with the purchase, settlement, development or management of farm land. These agencies included the State Advances Corporation (later to become the Rural Banking and Finance Corporation), the Valuation Department, the Department of Lands and Survey (which undertook the development of Crown land for farming purposes), the Department of Agriculture and the Department of Maori Affairs. These Government agencies, together with farm improvement clubs and farm consulting businesses, remained the predominant employers of farm management graduates until the deregulation of the 1980s. Since that time there have been fewer opportunities in the government sector, but a compensating increase in the opportunities for farm management graduates employed by agribusiness firms (such as fertilizer companies) and banks, where they are sought after as rural lending officers. Currently, the number of students graduating from farm management programmes at Lincoln University would be approximately 100 per year.

A key feature of farm management education in New Zealand has been the large number of degree and diploma graduates who have either returned to family farms or pursued alternative paths to farm ownership. Anecdotal evidence suggests that most graduates eventually pursue farming as either a part-time or a full-time career. It is also the expressed intention of many current students to 'go farming eventually', which reflects the relatively high status that farming holds as a profession within New Zealand.

FARM MANAGEMENT TEACHING IN NEW ZEALAND

Not surprisingly, farm management education in New Zealand has always been market driven. In direct response to the Depression era need for restructuring, Lincoln College (at that time a college of the University of New Zealand) established its Diploma in Farm Management and Valuation for students who had completed the existing Diploma or

Certificate in Agriculture. Graduates from this programme rapidly gained a reputation as specialists in debt restructuring and farm supervision.

The training that they received reflected the demands of industry and the vision of Albert Flay, an agronomist at Lincoln College who understood the limitations associated with advising farmers on agronomic matters in isolation from other components of the whole farm system. He and his colleagues Bevin and Garrett developed Farm Management courses that were largely prescriptive, with a focus on understanding farmers and the whole farm system.

The farms' physical resources, including soils, climate, pastures and crops, were considered in the first instance, along with farm improvements and the productive potential of the farm. This description of the resource base was followed by an assessment of the management of the farm, including the standard of the husbandries and production levels. In this respect, particular importance was placed on the integration between enterprises, such as sheep and cash crops, and their impact on the availability of farm resources. Finally, financial performance was measured with the preparation of an annual budget. The human factor was considered an important part of the approach, with strong emphasis being placed on the objectives of the farm family.

This approach to farm management was delivered through the medium of case study visits to farms. Small groups of students would visit farms and follow the prescriptions dictated by the 'whole farm' approach. The farm inspection was a comprehensive assessment, including digging soil profiles in every paddock to identify changes in soil type. Livestock and crops would be inspected and pastures assessed. The farmer was an integral member of the case study team, accompanying students and discussing all aspects of the management of the farm. After the farm visit, the case was discussed in class, with students being required to defend their assessments against challenges by their peers. The case study farmers were often involved in such discussions.

A key philosophical issue associated with the case study teaching was that the case studies were always field-based and addressed 'real issues'. In essence, the 'whole farm approach' meant a focus on issues, and an implicit recognition that it was not helpful to structure the issues into soils issues, animal issues, agronomy issues, finance issues etc. Rather, the focus was on documenting the resources, identifying issues and problems, identifying alternative actions, and then analysing these options in physical and financial terms. As a result, case studies often included specialists in other subjects, such as agronomy and livestock, as well as farm management lecturers.

Consistent with the case study approach, the final assessment for students majoring in farm management included a major 'field test'. The student, accompanied by a staff member, would visit a farm for a day and was then required to complete a major assignment on this farm over the next week. This assignment included the elements of the prescriptive approach to analysing the 'whole farm' including an assessment of the farm's resources, a discussion on the management of the farm, a budget and a development programme. In essence, the field test evaluated a student's ability to observe, to source information, to identify issues, to analyse alternatives and to make judgements.

In the 1950's, farm management was elevated to degree status when provision was made for it to be included as a major specialisation in the existing Bachelor of Agricultural Science. This trend continued in the early 1970s when the Diploma in Valuation and Farm Management

was phased out while a Bachelor of Agricultural Commerce was phased in. However, the retention of a farm management qualification at Diploma level ensured that the market for diploma training in the area was met. Currently, students specialising in Farm Management can do so within a two-year Diploma in Farm Management, a three-year Bachelor of Commerce (Agriculture) degree and a four-year degree, Bachelor of Agricultural Science.

Over time, there have been many changes to the farm management programmes at Lincoln University, but a strong emphasis on case study teaching has been retained. A notable characteristic of both the agricultural science and agricultural commerce courses at Lincoln University is that all students, regardless of their major field of study, are required to take at least one course in case study based farm management.

Perusal of farm management notes provided to students in the late 1960s indicates that the roots of farm management teaching lay in no particular field. At that time some 1100 pages of notes and conference-type papers, totalling more than 400,000 words, were provided to students (Lincoln College, 1968). The principles of economics, accounting, and finance were all drawn upon in these teaching materials, but if there was an overarching framework it was the iterative cycle of planning, implementation and control, and the application of this cycle to issues of production, personnel, finance and marketing. Farm management was a very applied subject dealing with the issues, decisions and systems of the major New Zealand industries of sheep and beef farming, dairy farming, and cropping (cereals and small seeds). Because the focus was on such a narrow range of industries (reflecting the realities of New Zealand farming at that time) there was a reasonable expectation that students should be able to apply principles to real situations. Students were expected to understand the technologies of these industries, and this understanding was developed through vacation practical work requirements undertaken on each of these farm types, plus compulsory subjects in plant and animal production.

Separate courses were (and are still) provided in economics to complement the farm management courses. Back in the 1960s and early 1970s it was Earl Heady's 'blue brick' titled 'Economics of Agricultural Production and Resource Use' (Heady, 1952) that provided the cornerstone of production economics analysis. Complementary courses were also taught in rural sociology and extension, although only a minority of students took these. Given that students came from either a rural background or else received major exposure to farms and farmers through the vacation practical work requirements, it was implicitly assumed that students would understand the sociology of farming and rural communities without formal studies thereof.

Given the prime allegiance within farm management course to problem identification and solution there was ready acceptance of any approach that appeared likely to be helpful. Farm management courses evolved rapidly with the emergence of:

- new analytical techniques (such as linear programming and decision analysis),
- new issues (such as the implications of financial deregulation), and
- new technologies (such as computers and spreadsheets).

Techniques that failed to live up to their initially perceived potential as aids to applied problem solving were subsequently discarded from mainstream teaching. Accordingly, within current teaching there is little emphasis on linear programming and quantitative decision analysis. However, considerable emphasis is currently placed on business management and strategic management principles drawn from general management theory,

and the importance of strategies for ongoing improvement (i.e. striving for and maintaining competitive advantage).

The cornerstone of how alternative strategies are assessed remains the cash flow budget (monthly, annual and long term). Computer spreadsheet analyses allow much more detailed assessments of variability and 'what if' investigations than was previously the case.

Financial constraints have at times lead to careful consideration as to whether alternative delivery methods, with less emphasis on case study teaching, might be justified. In general, farm management teaching staff have strongly resisted such moves. Although there have been some restrictions enforced by the University, a degree student majoring in farm management still undertakes approximately 15 case study visits to Canterbury farms, and spends another 15 days on longer field tours. The essential elements of the traditional field test have also been retained, although students now work on the analysis of their allocated field study farm intermittently over a period of months rather than a concentrated one-week period.

FARM MANAGEMENT RESEARCH IN NEW ZEALAND

The early farm management research undertaken at Lincoln in the 1940s and 1950s was largely descriptive of farming systems, including required inputs, typical outputs, and timing of operations. Gross margins and sometimes net margins were calculated. Results were typically published in Canterbury Chamber of Commerce bulletins, and the focus was on providing information that could be used in extension and teaching.

A major advance came with a contracted study undertaken in the early 1960s comparing farming systems and financial results achieved by dryland and irrigated farmers in mid Canterbury (Stewart, 1963; Stewart and Haslam, 1964). The purpose was to provide information relevant to water pricing, and the study required detailed accounts analysis and standardisation. As with the earlier research of the 1940s and 1950s, the research was empirical and positive, dealing with issues 'out on the farm', but drawing on principles of economics and accounting

This stream of empirical research has continued through to the current time, although from the mid 1960s to the early 1990s it had a low profile. Within the last 10 years it has started to achieve a higher profile again. In addition to drawing on quantitative survey techniques, a number of masters and doctoral studies of this type have been undertaken within the qualitative genre (Patton 1990), drawing on case study research methodologies (Yin 1994) and grounded theory (Glaser and Strauss, 1968; Glaser, 1978). A lot of this research has focused on the behavioural aspects of farmer decision making and linkages between farm level decisions and the agribusiness value chain. Examples of such empirical research include work on risk management (Martin and Lee, 1991; Martin, 1996; Martin and McLeay, 1998) and research on marketing strategies by farmers (McLeay et al, 1996).

Despite their low profile for many years, applied investigations have always been drawn upon extensively as a source of teaching materials and teaching insights. Much of this research material (which the investigators have not always themselves perceived as being 'research') has never been formally published.

The first quantitative programming study undertaken at Lincoln University appears to be that of Stewart and Nuthall (1964). Thereafter there was a steady stream of interest involving linear programming and its extensions (for example, Dent et al, 1986), and since the 1970s there has been ongoing research in simulation methods (see Finlayson et al, 1995; Cacho et al, 1995, for indicative examples). From the mid 1960s there was strong interaction between quantitative farm management researchers at Lincoln University and their counterparts in the British, American and Australian Universities. There was also considerable interaction with counterparts at Massey University, which is New Zealand's only other university with an agricultural charter, and where farm management was also by then being developed as a major discipline.

Quantitative farm management research undertaken at Lincoln University has typically focused on how farmers might achieve better results. The approach has usually been normative, based on analyses undertaken using mathematical models, and often technique related. During the period 1975 through to 1985 this work was led by Professor Barry Dent, and then more recently by Professor Tony Bywater. These studies have been widely published in the international literature, but it is debatable as to the extent to which they have influenced either farmer practice or farm management teaching. This is not to suggest that they have had no influence, for there can be little doubt that both linear programming and system simulation have helped farm management professionals to structure problems and perceive issues in ways that would not otherwise have occurred. But it would be difficult to argue that they have transformed in any fundamental way the farm management discipline as it currently exists.

Research into farm information systems, linked closely to the development of computing software for farmers through the Kellogg Farm Management Unit, has also been a field of considerable endeavour at Lincoln University (see, for example, Nuthall and Benbow, 2000). Although the University no longer develops commercial software, Dr Peter Nuthall continues to lead a research program investigating farmer decision processes and management competencies (Nuthall, 2001). This work is informed, *inter alia*, by insights from the disciplines of psychology and management.

WHERE ARE OUR ROOTS?

A reasonable interpretation of the farm management profession in New Zealand is that there has been and is a philosophical dichotomy within the profession. On the one hand there have been those whose focus has been on applied problem solving. On the other hand there have been those whose focus has been on developing new techniques and methods of analysis. The first group have always placed prime allegiance on the issue, and have been very wary of '*ceteris paribus*' assumptions. The second group have tended to be trained in specific principles emanating from a range of disciplines (*inter alia* economics, computing, animal science, agronomy) and have then looked for issues and problems that they can apply their knowledge to. Typically, the models that are employed require specific assumptions if model solutions are to be generated, and these assumptions are often simplifications of the 'real world'. Proponents would argue that this approach is justified because it is the only way that complex problems can be made tractable. The first approach could also be described as client or farmer focused, whereas the second approach could be described as research or technique focused.

It is contended that the dominant paradigm within the New Zealand farm management profession, including undergraduate teaching but not necessarily amongst researchers, has been the problem-focused farmer-centric approach. Central to this approach to farm management is the view that context is of fundamental importance, hence the focus on analysis of resources. In addition, the way in which farm management courses have been modified over time in response to changing external conditions gives further credence to the proposition that it is real world issues that are important. For example, the economic environment of the 1930's Depression led to a move to restructure farm debt, which in turn created a demand for professionals who could construct 'whole farm' budgets and were skilled in rural valuation. This led to the case study 'whole farm' approach to teaching farm management. Likewise, government policy in the 1970's, which was designed to encourage increased farm production, led to a focus by farmers on farm development and the incorporation of principles of investment analysis into teaching programmes. Similarly, when deregulation occurred in the mid-1980's, farmers were forced to take a more strategic approach to their farm business and become more attuned to off-farm influences. As a result, greater attention was paid principles of strategic management and marketing.

The choice of techniques employed by practitioners of this farmer-centric and issue focused approach to farm management is determined by pragmatic considerations of what is available and known about, and what seems relevant. As a consequence, within the dominant paradigm there has always been an openness to new approaches. Production economics was embraced in the 1950's, followed by the developments of linear programming starting in the early 1960's, hard systems thinking and simulation modelling starting in the later 1960's, and decision analysis was considered more peripherally. Starting in the late 1970's farm management teaching was influenced by the development of new management thinking emerging from American business schools, and more recently, there has been particular emphasis on strategic management theories, entrepreneurship, value chain and supply chain concepts, and strategies linked to sustainable competitive advantage.

The key criteria in relation to the ongoing use or otherwise of a technique, framework or theory has been whether or not it will enhance the quality of decision making. As a result, no one discipline is seen to hold all the answers. Principles of economics, accounting, finance and business management, as well as science disciplines relating to production technologies, may be drawn upon but none are seen as providing an overarching disciplinary framework. If there is such a framework, it is the iterative management cycle of planning, implementation and control, and the application of this cycle to issues of production, personnel, finance and marketing within a structural framework of resources, alternatives and objectives.

Those professionals outside the dominant paradigm have typically been researchers with expertise rooted in a particular discipline. These researchers have typically applied their disciplinary framework to particular problems. On occasions simplified real world problems have been taken to illustrate a chosen technique. Given that these researchers typically use the same or similar techniques as they move from issue to issue, it is hard to argue against the proposition that it is the technique that comes first.

It is argued that there has also been a dichotomy of paradigm amongst farm management students, with most students being comfortable with a learning style based on applications from which general principles can be elicited. It is only a much smaller group of students that have been comfortable with the learning of abstract principles and then seeking out applications thereof. In essence, the applied problem solving and case study approach has

fitted the learning style of most farm management students, and this has been a major factor in the success of farm management as a major field of study.

Before taking further the issue of 'where do our roots lie', it is helpful to and explore some issues of disciplinarity. It is generally accepted that most science is based on a reductionist approach where knowledge is compartmentalised. Scientific research is typically undertaken by specialists whose expertise is often very narrow. While this approach has much value, there is increasing recognition that reductionism based on disciplines and sub disciplines can, in some circumstances, lead to blinkered and partial solutions to poorly defined issues. The emergence of systems thinking over the last forty years, initially relating to 'hard systems' but more recently also relating to 'soft systems', is one response to perceived weaknesses of the traditional approach (Ackhoff, 1973; Checkland, 1981; Checkland and Scholes, 1990).

Recognition of the limitations of analyses undertaken from within single disciplines has led to widespread discussion by thinkers from many fields of endeavour as to how the disciplines can and should relate to each other. A typology is emerging in which interactions between the disciplines are classified four ways (Wolfenden, 1999; Nicolescu, 1997; Gill, 1997).

A *disciplinary* approach implies that a problem is analysed from the perspective of a particular discipline. Most published research is of this form, and indeed most of the scientific journals are dedicated to specific disciplines.

A *multidisciplinary* approach refers to a situation where several disciplines focus on a particular problem, with each discipline bringing its own perspective to the problem but none of them integrating the perspective of the other disciplines. Multidisciplinary studies usually occur with the disciplines operating in parallel and each providing its own unique perspective. The task of integrating the findings, if it occurs at all, is left until the end. Similarly, in a teaching context a multidisciplinary approach could involve a case study that was used to illustrate principles relating to agronomy, soils, animal science and economics, without focusing on the bigger picture as to how the disciplines interact within farming systems and farmer decisions.

By contrast, an *interdisciplinary* approach to a problem requires that the perspectives of a range of disciplines are explicitly integrated. Typically, interdisciplinarity occurs when a researcher has prime allegiance (based on training) to a particular discipline, but explicitly draws on principles or findings from other disciplines to enrich the analysis.

A fourth category, the *transdisciplinary* approach, is subtly different from the previous approaches, but this difference is important. In this case, the starting point is a problem or issue, not a discipline, and through the process of problem solving, knowledge is accessed from those disciplines that can contribute to the solution of the problem. There is no prime allegiance to any one discipline but there is an inviolate allegiance to dealing with the complex issues of the real world. As such, simplifying assumptions and *ceteris paribus* are anathema to the transdisciplinary analyst. The transdisciplinary thinker prefers to deal with messy strategies for tackling real problems, rather than elegant solutions to artificially defined problems.

The typology outlined above is just one typology, and there are other typologies currently being promoted (Klein, 1990). Some writers use terms such as 'crossdisciplinary' and 'pluridisciplinary' and not everyone defines each term in exactly the same way. The question

of how different disciplinary approaches can be brought together and integrated is something that is exercising many minds. Much of the debate is fast moving, occurring through the internet rather than the journals, and because the debate is being driven by experiences in many fields of endeavour, the debate it is still evolving.

So how does all this relate to farm management? It is obvious that both multidisciplinary and interdisciplinary approaches to farm management teaching have been used over the years. A multidisciplinary perspective occurs when students take separate courses in soils, plants, animals and farm management, and they are then expected, to some extent, to integrate the different perspectives they gain from these courses. Some field trips reinforce this, with different subject examiners cooperating with each other on the trips, but each retaining their own separate objectives. More often, though, the farm management specialist takes an interdisciplinary approach, and sees it as his or her role to integrate the various insights from the different disciplines, with this being done in the 'whole farm' context. It is the 'whole farm' approach with its emphasis on farmer objectives that drives the integrative approach.

However, features of farm management teaching and practice outlined above suggest that farm management in New Zealand goes beyond a multidisciplinary or interdisciplinary approach. The problem oriented 'whole farm' case study approach with its associated sensitivity to context and acceptance and abandonment of new approaches, along with the fact that there is no overarching disciplinary framework, suggests a more transdisciplinary outlook.

Although it can be argued that the teaching and practice of farm management are predominantly transdisciplinary, this does not appear to be the situation with most research conducted in New Zealand. Much of the research would seem to be interdisciplinary, owing its prime allegiance to a particular discipline, but drawing on other disciplines to enrich the analysis. There appear to be good reasons for this, since if all research were to be transdisciplinary, then farm management could become isolated from new ideas and insights emerging from various disciplines. Therefore, interdisciplinary and transdisciplinary research should be seen as complementary rather than competitive, since each are capable of informing the other.

What is perhaps remarkable is that the transdisciplinary paradigm of farm management is largely unstated within New Zealand. Indeed, the nuances between multidisciplinary, interdisciplinarity and transdisciplinarity are probably not recognised by many New Zealand farm management academics. The paradigm is largely implicit and assumed, and derives from the philosophy that farm management deals with real issues and problems, with techniques subservient to issues.

Some features of the transdisciplinary, and to a lesser extent interdisciplinary, approach to farm management that has arisen in New Zealand are likely to be familiar to this audience. Wright (1989) advanced a similar position at this Conference in 1989, when he argued that management is not a discipline. Instead, he maintained, it is problem-oriented, filching ruthlessly from all disciplines that have something to offer. Likewise, the FSR approach advocated by Brennan and McGown (1992) at last year's Conference embraces a mix of approaches to farm management research, with the perspective of the farmer an important component that ensures a problem-oriented focus to the research.

CHALLENGES OF TRANSDISCIPLINARY AND INTERDISCIPLINARY APPROACHES

The strength of the transdisciplinary approach to farm management is obvious from the previous discussion. When a disciplinary approach is taken it seems to inevitably become a 'discipline in search of a problem', which can lessen its relevance to decision making. The transdisciplinary approach shifts the focus to 'a problem in search of a discipline'. Because it starts with a problem and then accesses knowledge from those disciplines that can make a contribution to solving this problem, it must, by definition, deal with issues that are of relevance to decision makers.

Likewise, an interdisciplinary approach must score much higher on the relevance criterion than more disciplinary research or teaching. While not necessarily as problem focussed as the transdisciplinary approach, nevertheless it can yield relevant insights by attempting to integrate insights from a range of different disciplines into the discipline to which prime allegiance is owed.

While the advantages of these approaches are easy to appreciate, there are also major challenges associated with accessing a discipline or disciplines thought to be relevant for any given problem. Where the solution to a particular problem is too quickly seen to lie in a particular discipline, there is a danger that a transdisciplinary or interdisciplinary approach may metamorphose into a disciplinary approach. There is also a danger that the disciplinary knowledge limitations of the particular analyst could artificially constrain the contributions that could be made by a broader range of insights.

Consider a marketing example to illustrate this. Since deregulation, beyond-the-farm-gate issues have assumed greater prominence. Therefore, a 'problem' might focus on how farmers might become involved in marketing. The corresponding solution to this problem would seem to embody prescriptions on how farmers should market their products. The appropriate discipline to access in this case would seem to be marketing management (see, for example, Kotler (1998)). A tempting approach to this problem would be to package the 'marketing mix' for an agricultural audience; that is, to suggest that farmers formulate their own strategies for product, price, place and promotion.

However, even in a deregulated environment, most farmers are likely to decide that such an intense involvement in marketing does not reflect their distinctive competence, a conclusion supported by McLeay et al (1996), who found that only nine per cent of Canterbury mixed cropping farmers were differentiators employing the full marketing mix, whereas 33 per cent had no professed interest in marketing and grew a stable crop mix suited to the conditions on their farm. The remaining 58 per cent employed a range of different marketing strategies utilising different parts of the marketing mix. These included a flexible crop mix, flexible channel selection and taking advantage of arbitraging opportunities by storing crops when prices were low.

An interdisciplinary or transdisciplinary approach to this marketing problem would require researchers to recognise this reality and to package the marketing management principles in such a way that farmers could appreciate the benefits and risks associated with alternative marketing strategies. For example, the differentiator would gain returns but incur risks associated with formulating a market niche with its associated pricing and promotion strategy.

At the opposite end of the spectrum, the more traditional farmer with no professed interest in marketing might need to appreciate that he or she is actually making a marketing decision when making a product choice based on one criterion (that is, to produce what suits the farm), and that this decision has risks associated with it. Most notable among these is the choice to be a price taker at the mercy of existing marketing channels, and the risk associated with a downturn in market demand for the product being produced. She or he might then be encouraged to consider strategies that might ameliorate these risks.

Therefore, there is skill involved in ensuring that problem remains rooted in its environment and the challenge for the farm management professional is to ensure that this occurs. Otherwise, the much criticized disciplinary approach is likely to insidiously reassert itself.

The above example raises another challenge for an interdisciplinary or transdisciplinary approach to farm management problems. Such a farm management professional will not necessarily be familiar with the subtleties of a particular discipline and may be somewhat naïve in her or his understanding of the discipline and the present status of different theories within this discipline.

For example, if a problem under consideration centred on the competitive advantage of a group of farmers, then invoking Porter (1980) might lead to a discussion on the merits of a cost minimisation strategy versus a differentiation strategy, which Porter initially viewed as mutually exclusive strategies. However, more recent literature discusses a range of hybrid strategies and suggests that such hybrids might be more appropriate in particular circumstances (Chrisman, et al, 1988; Miller and Dess, 1993; Reitsperger, et al, 1993). This challenge implies that the farm management professional needs to recognise his or her limitations and form networks with people who operate within different disciplines.

The situation is exacerbated when multiple disciplines are invoked to provide a solution. In this case, the challenge is associated with integrating the insights offered by different disciplines. In addition to drawing on networks of specialists in particular disciplines, the farm management professional must integrate the insights from these various disciplines.

How this integration process occurs is by no means clear. In the world outside academia, it is the managers of organisations who are expected to draw together and integrate insights, and as such, they are not expected to be experts in anything other than the process of managing, which includes this process of integration. Currently, much of the integration process within farm management appears to be informed by experience and judgement, and much of it is inductive rather than deductive. The procedures are implicit and involve subjective judgements, rather than being explicit and objective.

The iterative management cycle of planning, implementation and control, linked to problem structuring in terms of resources, alternatives and objectives, could be viewed as providing the integration framework in farm management, with this process then being applied across the span of production, personnel, marketing and finance. However, this is open to debate, and a fertile field for enquiry could be to further explore what is really meant by integration, which might lead to further insights into the process of integration.

What do these challenges imply for the farm management professional? Such a person will need to remain problem focussed and ensure that problems emerge from the farming environment. He or she must ensure that any discipline that is accessed for problem solving

purposes is used with integrity, and that where more than one discipline is used, that integration occurs between these disciplines with respect to the problem.

Strong networks, both within the farming community, and with professionals from a range of disciplines, are also required. It is possible to envisage the situation where the transdisciplinary farm management professional has the expertise in eliciting problems from the farming community works. She or he might then work closely with others who operate within an interdisciplinary framework, who are skilled in identifying which disciplines might contribute to the solution to the problem. These interdisciplinary professionals might then liaise with disciplinary experts in these areas. Thus, problem-solving teams might coalesce and disband as problems emerge and are then solved.

A further challenge for the transdisciplinary or interdisciplinary farm management academic is that it is difficult to find a natural home in an environment where teaching, research and administrative units tend to be structured and funded on a disciplinary basis. For example, farm management draws on the biological sciences, commerce and the social sciences, but belongs to none of these areas exclusively. In addition, interdisciplinary and transdisciplinary professionals are characterised as ‘generalists’. Most academics appreciate only too well the danger inherent in this position, since academic rewards tend to accrue to specialists rather than generalists. It is suggested that farm management academics, both interdisciplinary and transdisciplinary, should characterise themselves as ‘specialists in integration’.

AGRICULTURAL ECONOMICS IN AN INTERDISCIPLINARY AND TRANSDISCIPLINARY FARM MANAGEMENT PROFESSION

The criticisms of the application of agricultural economics to farm management problems stem largely from its disciplinary focus. Malcolm (1990) argues that the methods associated with this approach are too narrow in focus and tend to predetermine problem definition, whereas the fundamental skill in farm management is in identifying the problem and then devising solutions. Wright (1989) argued on similar grounds that economics should not see itself as the parent discipline of farm management.

Agricultural economics clearly has a role to play as a contributing discipline to farm management if the problem in question demands this. For example, if the problem is how to determine the optimal ration in an intensive pig or poultry operation, then principles of production economics that are operationalised through linear programming can provide a solution to this problem that is relevant to decision makers.

Also, if packaged in a way that farm managers find easy to digest, then agricultural economics can also sharpen the analysis of a problem by focussing on underlying economic principles. For example, teaching farm management students in a disciplinary economics context that an input, i , is employed until the $MVP_i = P_i$ (assuming a perfectly competitive market) is unlikely to have as much impact. However, if phrased as a ‘real life’ problem about whether it is worth putting more nitrogen (N) on a green feed brassica crop to be fed to sheep, then this marginal analysis assumes greater relevance. Students would then be able to determine what the increase in crop yield will be from applying the extra N recommended by their soil science lecturer and how this translates into extra liveweight weight gain by the sheep. They could then decide whether the cost of the extra fertiliser was worth it in terms of the extra revenue gained after the sheep have been slaughtered. This explanation might seem

unnecessarily verbose to the mathematically tidy, and the question of which example to use a minor detail. However, generating ‘real life’ problems such as this and explaining them in a realistic farm management setting lies at the heart of both interdisciplinary and transdisciplinary approaches to teaching farm management, as students are rarely able to translate principles accessed in one discipline to problems encountered in another.

In addition to packaging itself in a more palatable way, agricultural economics could also have a greater impact on farm management if attempts were made to integrate different insights in a particular area of interest. For example, when different aspects of risk and risk management are considered in a ‘whole farm’ context and packaged appropriately, then a risk management framework that is useful for teaching can emerge (Martin and Lee, 1991; Martin and Shadbolt, 2000).

A definition of risk that is relevant for farming can be elicited using the concept of business and financial risk and how these interact. Students can appreciate that downside variability in prices and yields (and to a lesser extent, input prices) will have a greater impact on the farm business when financial risk (usually indebtedness) is high. They can then reflect on financial risk further, and explore the sources of business risk in a particular farming situation. They will then realise that risk management is an integral part of farm management, and not something separate, since sound cost effective practices that also increase yields and prices will reduce risk. They can deduce that a farm has three options available to it if it wishes to reduce its risk. The first option is to reduce business risk by smoothing out peaks and troughs in prices and/or yields. A second possibility is to reduce business risk by truncating troughs, while the third possibility is to accept the variability in prices and yields and opt for a low level of financial risk. A selection of production, marketing and financial strategies can be used to support these three options, different combinations of which might be preferable to particular farmers and farming situations. When undertaking this analysis, they will become aware that they each have a tolerance for risk (degree of risk aversion) that might differ from that of their peers, and that this risk aversion will determine how much of a ‘buffer’ they should build in when they are managing risk. Finally, when asked to reflect on what would happen when the risk environment changes abruptly, as it did when deregulation occurred in New Zealand, they will realise that their exposure to both business and financial risk has increased in this situation, and that they will need to readjust their risk management practices so that their risk is reduced to a level compatible with their degree of risk tolerance.

This simple explanation of the principles of risk management is built on many of the insights generated by agricultural economics in its vast treatment of risk management over the years, and has been grounded in the experience of farmers who actively manage risk day by day. What makes it different to the more traditional agricultural economics approach to risk is that it has placed the insights provided by the economics discipline and into an integrated framework.

To conclude, acceptance that farm management is not a sub discipline of economics should have a liberating effect on farm management economists. Once it is recognised that farm management economics is just one subset of an interdisciplinary and transdisciplinary approach to farm management, then the burden of having to provide answers to all farm management issues is lifted. In such an environment, farm management economics may once again flourish, alongside agricultural marketing, agricultural finance, and so on. Economics has much to offer farm management – as do many other disciplines. Economics has a set of enduring principles that can inform many problems, and provide rigour to farm management

analyses. There will always be a role for farm management economics. The key issue is that economists must not confuse farm management as being the same as farm management economics.

REFERENCES

- Ackoff, R.L. (1973), 'Science in the systems age: beyond IE, OR, and MS,' *Operations Research* 21, 661-671.
- Brennan, L.E. and McGown, R.L. (2002), 'Back to the future – reinventing farm management economics in farming systems research,' Contributed paper to the 46th Annual Conference of the Australian Agricultural and Resource Economics Society, 13-15 February, Canberra.
- Cacho, O.J., Finlayson, J.D.; and Bywater, A.C. (1995), 'A simulation model of grazing sheep: II. Whole farm model,' *Agricultural Systems* 48, 1-25.
- Chekland, P. (1981), *Systems Thinking, Systems Practice*. Wiley and Sons, Chichester.
- Checkland, P. and Scholes, J. (1990), *Soft Systems Methodology in Action*. Wiley and Sons, West Sussex.
- Chrisman, J.J., Hofer, C.W. and Boulton, W.R. (1988), 'Toward a system for classifying business strategies,' *Academy of Management Review* 13(3), 413-428.
- Dent, J.B. and Blackie, M.J. (1979), *Systems Simulation in Agriculture*, Applied Science Publishers, London.
- Dent, J.B., Harrison, S.R. and Woodford, K.B. (1986), *Farm Planning with Linear Programming: Concept and Practice*, Butterworths, London.
- Finlayson, J.D.; Cacho, O.J. and Bywater, A.C. (1995), 'A simulation model of grazing sheep: I. Animal growth and intake,' *Agricultural Systems* 48, 27-50.
- Gill, R.A., (1997), 'Exploring transdisciplinary themes: The New England Ecological Group's focus on the meaning and application of ecological economics,' *The Ecological Economics Bulletin*, 2(1), 6-10.
- Glaser, B.G. and Strauss, A.L. (1968), *The Discovery of Grounded Theory*, Aldine, Chicago.
- Glaser, B.G. (1978), *Theoretical Sensitivity*, Sociological Press, Mill Valley, California.
- Heady, E.O. (1952), *Economics of Agricultural Production and Resource Use*, Prentice-Hall, New Jersey.
- Klein, J.T. (1990), *Interdisciplinarity: History, Theory and Practice*, Wayne State University Press, Detroit.
- Kotler, P. (1998), *Marketing Management: analysis, planning, implementation, and control*, 9th Ed., Prentice Hall.

Lincoln University (1968), Farm Management Notes: Volumes 1, 2 and 3, Farm Management Department, Lincoln University.

Malcolm, L.R. (1990), 'Fifty years of farm management in Australia: survey and review,' *Review of Marketing and Agricultural Economics* 58(1), 24-55.

Martin, S. and Lee, B. (1991), 'Risk in farming,' *Proceedings of the 8th International Farm Management Congress: Contributed Papers*, 224-230.

Martin, S. (1996), 'Risk management strategies in New Zealand agriculture and horticulture,' *Review of Marketing and Agricultural Economics* 64(1), 31– 44.

Martin, S. and Shadbolt, N.M. (2000), 'Risk management strategies in the whole farm context,' Invited paper to Workshop on Risk Management, OECD, Paris, June 2000.

McLeay, F., Martin, S. and Zwart, T. (1996), 'Farm business marketing behaviour and strategic groups in agriculture,' *Agribusiness: an international journal*, 12(4), 339-351.

Martin, S. and McLeay, F. (1998), 'The diversity of farmers' risk management strategies in a deregulated New Zealand environment,' *Journal of Agricultural Economics* 49(2), 218-233.

Miller, A. and Dess, G.G. (1993), 'Assessing Porter's 1980 model in terms of its generalizability, accuracy and simplicity,' *Journal of Management Studies* 30(4), 553-585.

Nicolescu, B. (1997), 'The transdisciplinary revolution of the University; condition for sustainable development,' Paper presented at the International Congress on Universities Responsibilities to Society, International Association of Universities, Bangkok, 1997.

Nuthall, P. and Benbow, C. (2000), 'Profitability of computer use on a sample of Canterbury, New Zealand, farms,' *Primary Industry Management* 3(2), 18-22.

Nuthall, P. (2001), 'Managerial ability: a review of its basis and potential improvement using psychological concepts,' *Agricultural Economics* 24, 247-262.

Patton, M.Q. (1990), *Qualitative evaluation and research methods*, Sage Publications, London.

Pittaway, S.F. and Plank, R.D. (1991), 'Farm management teaching and the development of professional farm management at Lincoln University,' *Proceedings of the 8th International Farm Management Congress: Invited papers*, 184-198.

Porter, M.E. (1980), *Competitive Strategy: techniques for analyzing industries and competitors*, The Free Press, New York.

Reitsperger, W.D., Daniel, S.J., Tallman, S.B. and Chismar, W.G. (1993), 'Product quality and cost leadership: compatible strategies?,' *Management International Review* 1993/1, 7-21.

Stewart, J.D. (1963), *The Comparative Profitability of a Sample of Irrigated and Non-irrigated Farms in the Ashburton-Lyndhurst area of Mid-Canterbury, New Zealand*. Lincoln College, Publication No1

Stewart J.D. and Haslam, H.A.R. (1964), *Profitability of Irrigation in Mid-Canterbury*. Agricultural Economics Research Unit Publication No 6

Stewart J.D. and Nuthall, P.L. (1964), *Programming a Canterbury Mixed Farm: Analysis of Alternative Cropping and Livestock Systems on a Canterbury Plains Arable Farm*. Agricultural Economics Research Unit Publication No 7

Wolfenden, J.A.J., 1999, 'A Transdisciplinary Approach to Integrated resource Management: A Pragmatic Application of Ecological Economics,' PhD Thesis, University of New England, Australia. Available at <http://www-personal.une.edu.au/~jwolfend/thesis.pdf>

Wright, V. (1989), 'Agribusiness management and farm management: some parallels and their implications,' Contributed paper to the 33rd Annual Conference of the Australian Agricultural Economics Society, 7-9 February, Christchurch, New Zealand.

Yin, R.K. (1994), *Case Study Research*, 2nd Edition, Thousand Oaks, California: Sage Publications.