ACTION RESEARCH AS A MECHANISM FOR CLIENT-DRIVEN DEVELOPMENT

Claire Massey
Department of Management Systems
Massey University

Evelyn Hurley

Ag/Hort Systems & Management Group

Institute of Natural Resources

Massey University

The New Zealand dairy industry is viewed, and views itself, as having a progressive approach to scientific research and the acquisition and adoption of technology. It is also generally accepted that, in order to remain competitive in international markets, technological improvement is a continual necessity. In each component of the industry/system - producer (farms), processor (co-operatives, manufacturing), researchers, extensionists/consultants and marketers (NZ Dairy Board, statutory authority) - practitioners deal regularly with issues requiring solution. However each has a different **W** (world view) and successful outcomes for one are not necessarily so for the others.

For producer practitioners the management issue may be one of seeking solutions to problematic situations by adapting known technology to their own production circumstances. The dairy industry model for this process is the research-consultant/extensionist-producer system. The industry view is that this process has been effective in "transferring" only some of the technologies which are viewed as important for the survival and development of the industry.

The paper builds on a project in which a group of dairy-farming women worked with two researchers on a particular technical problem. Using action research (AR) as a framework the group devised a problem-solving process that was structured around three elements; consultancy advice, research findings and self-directed learning in a structurally coupled action researching system. The paper describes the model that was developed, where AR provided a framework for client-centred research and consulting. The authors suggest that this model may contribute to the growth of the dairy system in a way that builds on the respective strengths of consultants, researchers *and* producers.

Introduction

New Zealand's dairy industry can be construed as a system which has evolved over its lifetime into fairly distinct components or sectors, each of which is essential to the successful function of the whole. Five major component sectors can be identified, namely production, processing, research, extension/consulting and marketing.

A FRST funded project was developed based on the premise that farmers (the production sector) had failed (or were slow) to utilise some potentially highly productive technologies. The need for restructuring in the research and extension/consulting sectors raised some concerns about the continued effectiveness of the 'technology transfer' process.

In this paper we focus on the role of those three sectors, discussing the basis of technology transfer between them. We analyse a case study of one project that offers a means to enhancing the process by which clients acquire, adapt and evaluate and perhaps adopt technology.

The Industry

The extension/consulting sector of the dairy industry is dominated by the Dairy Board's 34 consulting officers and 21 Farmwise consultants, the service operating as part of the Livestock Improvement Corporation (a fully owned subsidiary of the dairy board). Consulting officers focus on 'mass extension' with discussion groups and field days, but occasional individual contact with farmers. The service currently achieves contact with 60-65% of them. They also achieve a large degree of contact via two extension media for dairy farmers -- the Dairy Exporter (a monthly journal), and Farming with Pictures (a quarterly video sent to dairy farmers). Surveys have indicated a 90 percent audience for these media. Farmwise consultants operate on a commercial license similar to private consultants and compete directly with other private consultants (Journeaux 1998).

The research sector is dominated by government through its Crown Research Institutes (CRIs). Journeaux (1998) describes how these institutes were created after the research sector was subject to major restructuring in 1992. This change, which saw government funding for research centralized, meant that CRIs took on the responsibility for "the transfer of knowledge" to a particular sector as well as undertaking to operate in a commercial environment. They would bid for research funding, developing intellectual property that would belong to them.

The 1992 restructuring saw the creation of ten CRIs, five of which directly related to agriculture and the land. This research capacity was complemented by the research facilities established by the New Zealand dairy industry; the Dairy Research Corporation (DRC, a joint venture between AgResearch and the dairy industry) and the Dairy Research Institute (DRI). These organisations carry out research into dairy sector issues, with an emphasis on production and processing respectively.

The creation of these research institutes was based on the assumption that building the capability of the extension/consulting sector (the Dairy Board's consulting officers and Farmwise consultants) and the research sector (through the CRIs, the DRC and the DRI) would support the development of the production sector (the dairy farmers).

Taken together the research and extension/consulting sector would provide an infrastructure for producers to develop. The research sector would focus on the production sector as a whole, with a commitment to improving the contribution that producers can make to the economy in the long term. This would be complemented by extensionists/consultants who would focus on individual or groups of farm businesses and the immediate contribution that could be made by a single enterprise (or a defined group) in the short term.

However in New Zealand this model does not appear to be working. In a study designed to find out what dairy farmers considered to be their most important sources of information Butcher (1998) found that the producers were not maximising use of the resources available. Farmers reported gaining little information from discussion groups and field days (although there was no indication as to why they might continue to attend). They also commented that although "there is plenty of information

available", the individual farmer needs to know where to look for it. Significantly, they commented that the information was not always *in an appropriate form* for their use. Butcher concluded that individual farmers have their own preferences for delivery method of new information or technology. The implication of this research is that the research and consulting/extension sectors are failing to meet the needs of the production sector.

This may be because of the way technology transfer was defined in this study; as

> *the specific process by which farmers or growers become aware of, gain access to, interpret, and then apply, new knowledge, ideas or technologies*.

This definition emphasized that, for this sector, technology transfer must do more than just ensure that clients are aware of new technology and ideas. To be successful it must result in the implementation of the new idea and change in farming practice.

Another New Zealand study also found that farmers saw technology transfer as being concerned with results. Summarising the findings of an industry exchange forum Stantiall and Parker (1998) defined *technology* as being more than just information:

> *Technology is an 'idea' or a 'concept' that brings improvement or change to achieve a goal or purpose*

Similarly, *technology transfer* was defined as:

> *The transfer of information and ideas from one person or group to another*

Farmer members of the exchange offered the definition:

> *The passing on of ideas (information) in order to raise the level of awareness and understanding so that individuals could choose whether or not to successfully use the ideas to realise perceived benefits*

These definitions imply an understanding of technology transfer as a complex set of ideas that require in-depth consideration and in particular evaluation and choice. However, more importantly in the context of this paper, is that the concept of technology and technology transfer embodied by these definitions is one of farmers being the passive recipients of technology which has been developed by scientists and transferred by extensionists.

In this model of development, knowledge is gained and solutions to problems are devised by those in the research sector and passed on to those in other sectors who are then responsible for making them work. An assumption is that research and hence knowledge is the province of the researcher; the producer's role is to apply. Another assumption is that innovation is of itself development and will in time become universal, by virtue of innovative farmers adopting the technology which will then diffuse to others (Hamilton, 1995).

The New Zealand dairy industry model seems to be characterised by technology *transfer* activities. This is despite that fact that elsewhere these have been found wanting as a means of identifying appropriate objects of change together with the means by which change can be generated (Russell, Ison, Gamble & Williams, 1989).

By contrast a *participatory learning and action research* approach is about the generation of knowledge by co-experimenters in joint learning with researchers. The criteria which distinguish this approach include a defined and systematic learning

process, multiple perspectives and a group enquiry process in a specific context, facilitated learning leading to sustained action (Pretty & Chambers, 1994).

The case

This study arose as part of a larger project that had as its focus:

> *Researching extension methods relating to the dairy industry that explore farmer learning behaviour with a view to improving methods of technology transfer and uptake by the farmers of New Zealand*

A literature review, an industry exchange forum and its evaluation (Stantiall & Parker, 1998) formed the backdrop to a case study in farmer learning behaviour.

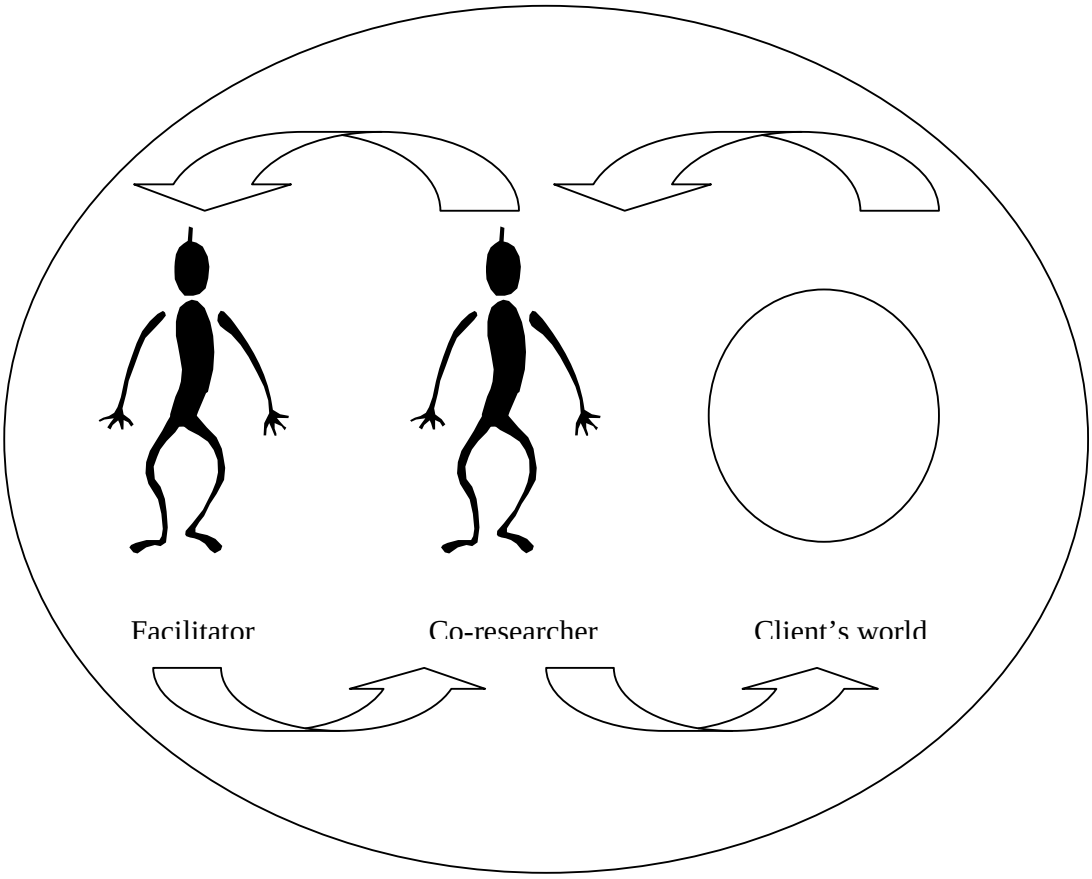
Action research (AR) was considered as the research approach for this element of the study because of its potential to address the issues raised by farmers at the exchange forum. These were chiefly concerned with the complexity of technology transfer and their need for alternative methods. AR had the added advantage of creating a situation in which change and research were simultaneous. It also appeared to have the potential to provide the most effective means of researching a situation where the development of knowledge was the objective.

To understand AR it helps to know something of its early proponents. The term itself is usually attributed to Kurt Lewin who used it to describe a way of "generating knowledge about a social system while at the same time attempting to change it" (Elden & Chisholm, 1993, p 121). Lewin and others working during the 1940s were committed to two parallel actions; affecting social change while at the same time contributing to improved public understanding of the importance of the issues being considered.

The basic premise of AR is that change and research are not mutually exclusive, and Bunning defines AR as a "way of investigating professional experience which links practice and the analysis of practice into a single productive and continuously developing sequence" (Bunning, 1994, adapted from Winter, 1989, p1). The central issue is the provision of a context in which the *simultaneous focus* on 'improving practice' and 'developing theory' is possible. "On a macro level AR can be understood as intervention experiments within particular practice contexts in which action researchers simultaneously test hypotheses pertaining to the resolution of particular problems and attempt to effect a (hopefully) desirable change in the setting based on their hypotheses" (Argyris & Schon, 1978, cited in Bartunek, 1993, p 1222).

In other words, the researcher becomes part of the research setting – rather than standing outside it as an objective systems analyst. Bawden (1991) describes this as a 'structurally coupled action researching system' in which the researcher works with co-enquirers to learn about the issues that are important within a particular system (Fig.1).

Figure 1: A structurally coupled action researching system (after Bawden, 1991)



The dual focus of AR (on practice and theory) results in an approach which is considerably different from that of 'traditional' research in terms of planning and implementation: whereas traditional research is based on the researcher observing the subject in order to prove a hypothesis (generated by the researcher), in AR the research question is developed through an interaction between the researcher and subject, based on their joint interests. This question provides an 'agenda' for the practice component of the research, which is subsequently used as the basis for the theoretical component.

Another distinctive characteristic of AR is the involvement of the research stakeholders. They may be involved in all stages of the research design; specifying the research issue, identifying a plan of action, monitoring the effectiveness of the action, and identifying what has been learned and how this should be communicated (Bunning, 1994). The team can consist of those experiencing the issues identified, (research sponsors), those attempting to solve the issue (research partners) and the expert researcher (Elden, 1993).

Although the origin of AR is in sociology, and more recently has come to be associated with educational research, its value is beginning to be acknowledged by those working within organisations of all types. One description of AR makes this link explicit; AR is "a distinct form in organisational development"; a "process of diagnosing, taking action, rediagnosing and taking new action" (French & Bell, 1995,

p 7). This definition is consistent with the argument that AR is useful in "planned change in social organisations" (Ledford & Mohrman, 1993, p 1355), and capacity building of individuals who are "engaging in a human process of building communities of inquiry" (Reason, 1993, p 1268).

In the project concerned the adoption of AR as the research approach affected every aspect of the research process. For example a key characteristic of AR is that the development of the research plan is not a discrete step that can be completed before the data can be collected, but continues to develop throughout the term of the study, with the input of the research participants. While the researcher may begin with a number of 'organising principles' that he or she hopes will provide a plan for the research, the input of the research participants may modify all or some of these principles. As a result' planning the research' and 'undertaking it' are more or less simultaneous, as the researcher goes through successive cycles of planning, researching, reflecting on the research and refining the design. This was the case in this study, as depicted in Figure 2.

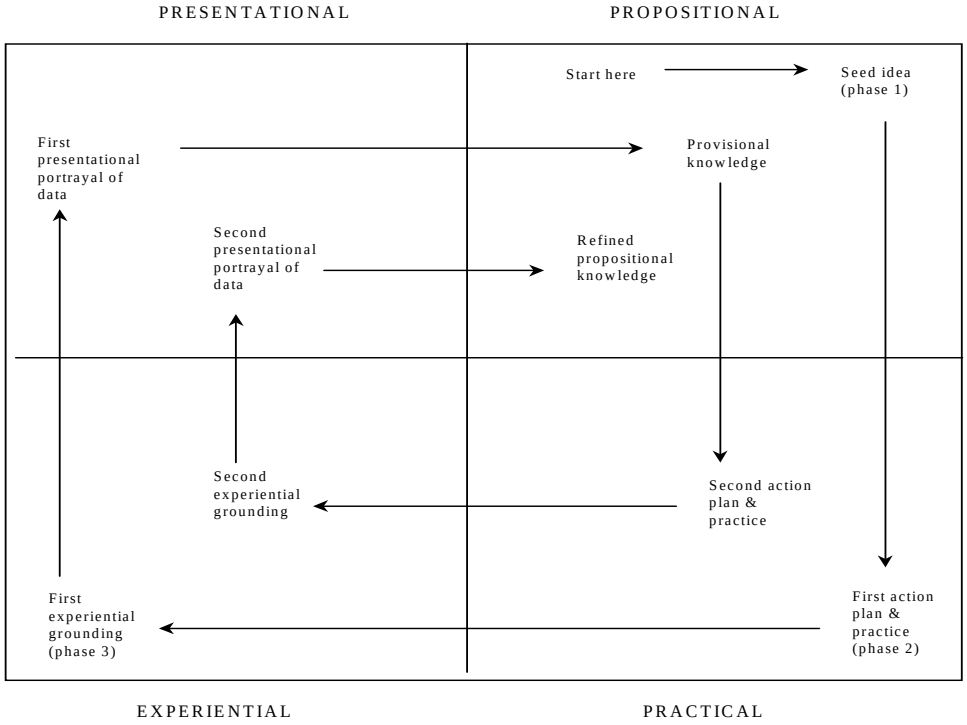
The field work

The researchers selected the initial participants from a list generated by a contact living within the area. Twenty-two dairy farm women were on this list and the researchers rang each one to invite them to the initial session. Twelve women indicated their interest and attended the first session. At this the researchers described the background of the project. They also undertook the exercises that had been developed for the farmers forum as a way of getting the women to talk about the topic of technology transfer, and their understanding of extension. The session ended with the group selecting a particular topic that they wanted to address; magnesium deficiency in dairy cows. This problem was not of significance to all the participants. The six who were interested in this topic agreed to form a research group.

The next meeting started with a discussion of what the group wanted to achieve through their participation in the research. This generated a number of ideas and questions, all relating to the central topic of magnesium deficiency:

- Why don't other farmers have the same problem?
- Why are the symptoms of the deficiency worse in areas of high rainfall? Does it get worse as stocking rates increase?
- Why does it happen?
- What are the factors in its occurrence?
- Can we find a way of balancing the factors?
- What are the signs that it is about to happen?

Figure 2: The action research cycle



- Is it inherited?
- Is it an issue on conversion farms?
- In what geographical areas does it occur?
- Are we making it worse for ourselves?
- How can we control it?

On the basis of this discussion, the group concluded that their desired outcome from the research process would be **"a realistic and cost-effective way of preventing magnesium deficiency in our environment".**

A secondary objective was related to research. Depending on whether the group finds relevant and accessible research, there was considerable feeling that **"essential research on the topic should be done immediately".**

The remainder of the session focused on planning the actions that members of the group would undertake in order to identify "a realistic and cost-effective way of preventing magnesium deficiency in our environment". The outcome of this process was a research plan, which included:

- a review of the practitioner literature (e.g. Dairy Exporters)
- interviews with farmers who had experience of the problem, particularly those who have farmer in other areas, and those who have moved out of the area
- an investigation into what research has been done in the area, particularly in reference to i) fertiliser input, ii) herds in different areas, ii) genetics
- interviews with professional advisors and independent experts
- case studies of group members' experiences particularly on their own farms

This research plan formed the basis for the remainder of the process, in which the group met four more times, gradually moving through the plan, which was also modified as the group thought of new ways of corroborating (or disproving) various suggestion that were made about the nature and cause of magnesium deficiency. As a way of validating the data they accumulated each would discuss the outcome of a group meeting with partners and other farming associates. An example of how the research plan was modified was in relation to the research question occurred at the third meeting when the researchers asked the group "how will we know when we've achieved our objectives? After some discussion it was clear that a revised objective had been tacitly reached; "to move one or more steps closer towards understanding (or being able to do something about it) the problem".

Some important characteristic of the project were

- the group was basically self-selected, not surprisingly since the topic turned out to be fairly technical and specific;

- that each research partner had a slightly different purpose. Individuals remained focused on their own objectives, while simultaneously contributing to the others and the development of theory through participation in the researcher's study;
- that each was quite clear when they had enough information to meet their own needs and be confident about implementing or not the changes which had been proposed.

Conclusion

Much of the impetus for developing the dairy industry is driven by the assumptions already stated; that a viable and progressive dairy sector has the potential to contribute to New Zealand in economic and social terms. Presented in this way the 'beneficiaries' of increased industry development are *all* the participants in the New Zealand economy, particularly those who are potential employees and customers. However, while from a macro-economic perspective these groups certainly do benefit from the development process, the primary stakeholders are the individuals who bear the commercial risks through owning and operating the farms themselves. The primacy of this group is sometimes overlooked by the other stakeholders in dairy industry development (the advisors, government agencies and institutions that make up the support infrastructure), and their needs are often emphasised, to the disadvantage of farm owners.

In terms of the development process the consultant, the researcher and the farmer all have different needs and expectations, as presented in Figure 3.

Figure 3: Needs and Expectations of Stakeholders in the Development Process

	Extensionists/ Consultants	Producers	Researchers
Short term focus	Ensuring clients are satisfied with the consultancy process (as a foundation for future work) Achieving contact levels via "mass" media	Achieving success (as defined by the owner e.g. growth, stability, increased lifestyle options)	Ensuring producers and consultants are comfortable with the research process (as a safeguard of future access) Papers for scientific journals
Long term focus	Achieving success (of their own organisation) Ensuring industry continuity	Achieving success (e.g. economically, physically and socially sustainable farming systems)	Contributing to scientific "knowledge", internationally; Greater understanding of the sector as the basis for revising action (e.g. government policy), based on interpretation of the data
Potential benefits	Clients adopting and implementing selected technologies. Fees generated;	Access to advice and information that can be immediately useful and readily applied	Access to data which reflect the whole of the production sector

As Figure 3 illustrates there is an implied relationship between consultants, researchers and producers. Despite their differing reasons for involvement in developing the dairy industry they are dependent on each other. However in practice this inter-dependence is largely ignored: individual farmers purchase advice if they believe it is necessary and occasionally participate in research when approached by a researcher seeking subjects. They regard the two processes as completely different, even though value may be gained from each. Nor are farmers alone in regarding their participation in extension activities and their participation in research as mutually exclusive. Some advisors and researchers are also in the habit of viewing their fields as the antithesis of the other, when in fact their interests are highly congruent.

It is the concept of congruence, and of providing value for *all* stakeholders that is explored in this paper. The argument is that there are potential advantages for the producer in utilising extension *and* participating in research, and that the division of the infrastructure into two distinct components may be failing to maximise dairy industry development. If this state of affairs remains unchecked the consequence is all too clear; the vigour that is currently applied to the separate components of dairy industry development will fail to produce any synergy: researchers will continue to undertake research that answers their needs (and potentially ignores that of the farmers), and consultants will continue to offer advice that answers their needs and that of their clients (and potentially ignores the questions of dairy industry

researchers). The challenge for those interested in the growth of the dairy industry is designing multi-functional development mechanisms which are of value to consultants, researchers and farmers.

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