

# ***Insights from the New Zealand experiment in Farmer First Research***

Janet Reid<sup>1</sup> and Rob Brazendale<sup>2</sup>

<sup>1</sup> *Institute of Agriculture & Environment, Massey University, Palmerston North, New Zealand, [J.I.Reid@massey.ac.nz](mailto:J.I.Reid@massey.ac.nz)*

<sup>2</sup> *DairyNZ, Palmerston North, New Zealand*

**Abstract:** The Farmer-First Research (FFR) programme was established at Massey University in 1991. The programme was strongly grounded in the work and thinking of people such as Norman Simmonds, Robert Chambers, Janice Jiggins and Niels Röling. At the time of its establishment, the programme was argued to represent the beginning of a fundamental shift in how agricultural research priorities were set and how agricultural research was implemented. The specific needs and circumstances of farmers were to be central to defining what research would be done and the active involvement of farmers in research was considered a priority.

The FFR programme ended after approximately five years in 1996. In 2012, the New Zealand Government made a significant investment into an innovation systems approach to technology development in the New Zealand primary sector. This new initiative, the Primary Innovation project, has many aims parallel with the FFR programme. The authors of this paper were researchers in the FFR programme and are now also both involved in the Primary Innovation programme. This paper explores retrospectively the FFR programme with the aim of identifying lessons that will inform the success of the Primary Innovation project. The innovation systems analysis framework proposed by Wieczorek & Hekkert's (2012) is used to critically reflect on, and explore, the FFR programme and the reasons the programme failed to gain long term purchase within the institutional context at the time.

This paper argues that a lack of broad actor engagement, and limited legitimacy and support constrained the programme's ability to influence sustained change in the prevailing innovation system at the time. Also argued is the critical importance of actors and interactions when a programme that seeks institutional and infrastructural change is being established and developed.

**Keywords:** innovation platform, farming systems research, innovation systems, New Zealand farming systems.

## **Introduction and rationale for paper**

The New Zealand Government has a commitment to 'double the value of primary sector exports from \$32 billion in June 2012 to \$64 billion by 2025' (Ministry of Primary Industries, 2013:1). In line with this commitment, in 2012 the Ministry of Business Innovation and Employment announced five years of funding for the Primary Innovation research project led by AgResearch a New Zealand Crown Research Institute. The project is described as being a 'collaboration across the primary sector [...] looking at the best way to convert ideas from scientific research into innovations that will improve New Zealand's economy' (AgResearch, 2012: n.p.). An agricultural innovation systems approach is being used, drawing on research and expertise from the Netherlands to develop and inform the project (e.g. Klerkx & Leeuwis, 2009 ; Klerkx et al., 2010 ; van Mierlo et al., 2010 ; Wieczorek & Hekkert, 2012). Hekkert et al. (2007), describe an innovation

system as the combined system of actors, interactions, institutions and infrastructure that initiate, import, modify and diffuse new technologies.

Contrasts can be drawn between the current Primary Innovation (PI) project and the historical FFR programme when they are viewed as New Zealand examples of innovation platforms. The PI project is a 'mechanism to operationalise the Agricultural Innovation Systems approach', that is, an innovation system as described by Nederlof, Wongtschowski, & van der Lee (2011:15). Looking back, the FFR programme was an attempt to develop an innovation platform to operationalise a farming systems research and extension (FSR&E) approach within the New Zealand primary sector innovation system. However, the FFR programme did not reach a stage where it was an innovation platform. Counter to what FARA (2007 as cited in Nederlof et al., 2011:14) identify as constituting an innovation platform, the FFR programme was not 'made up of various actors who co-operate, communicate and share tasks to carry out activities needed for innovation to take place'.

The FFR programme, established in 1991, ended after approximately five years. Both authors of this paper were research officers in the FFR programme during the 1990s and are also now actively involved in the PI project. The innovation systems approach has similarities to the approach that was central to the FFR programme. Like the PI project the FFR programme's aim was to transform the existing innovation system of which it was a part. This paper will review the FFR programme with the aim of providing insights to inform, not only the debate and discussion that is the theme of this session in the 2014 IFSA conference (Innovation platforms as drivers of institutional change), but the ongoing development and long term success of the PI project in New Zealand, also.

### **Paper structure**

The methods used to complete the review of the FFR programme and the theoretical framework that informs the review is outlined in section 2. An overview of the programme is provided against a description of the background to its establishment, the broader research context that existed at the time, its proposed structure and Phase one findings in section 3.

The review of the programme identified aspects that the authors argue shaped the programme and ultimately, also led to it not sustaining beyond five years. These aspects are outlined and discussed in section 4 of this paper. A brief consideration of the implications of the review of the FFR programme for the PI project is made in section 5 before the conclusions are made in section 6.

### **Methods and Theoretical Framework**

The insights described in this paper have been developed from a critical analysis of the FFR programme. The analysis was undertaken based on a review of documents related to the programme including research reports, proposals and published papers. In addition to our personal recollections, a number of informal semi-structured interviews were undertaken with individuals who were associated with and or knowledgeable of the programme when it was in place in the 1990s, including Massey University staff at the time as well as people from outside of the University. Sadly, Alan McRae who championed the programme died in 2007.

The critique of the FFR programme is framed by the analytical framework for technological innovation systems articulated by Wieczorek and Hekkert (2012), but not as intended by these scholars. The combined structural and functional (process) analysis of the framework was developed to analyse the performance of an innovation system, to identify systemic problems in the system and instruments to address the problems (Wieczorek & Hekkert, 2012). For this paper, the

framework is used to analyse and critique the effectiveness of the FFR programme in achieving structural and functional change that, according to the framework, would have constituted a well performing innovation system. No reported applications of Wieczorek and Hekkert's (2012) framework in agricultural innovation systems were found. The framework is used because it is currently informing research in, and development of, the Primary Innovation project in New Zealand.

The four elements that comprise the structural analysis of the framework are actors, interactions, institutions and infrastructure. The analytical framework is based on the premise that 'the presence or absence' of certain structural elements 'as well as their capacities are critical to the functioning of the innovation system' (Wieczorek & Hekkert, 2012:76). The seven functional components that shape an innovation system's performance are: F1 entrepreneurial activities; F2 knowledge development; F3 knowledge diffusion; F4 guidance of the search; F5 market formation; F6 mobilisation of resources; and F7 creation of legitimacy (Hekkert et al., 2007 ; Wieczorek & Hekkert, 2012).

The analysis reported in this paper, focuses on the FFR programme's efforts to alter structural elements in the existing innovation system linked to the sheep and beef sector. This focus is taken because the aim of the programme was to transform the existing innovation system and the programme when it ended was only in the early stages of achieving this aim. This meant that an analysis of the performance of the system by studying in depth the functions of the 'new' system would not yield many insights, although functions are considered in the analysis of the programme. As argued by Wieczorek and Hekkert (2012:78) 'functions [of an innovation system] cannot be influenced without altering a structural element'.

## **The Farmer First Research programme**

### **Background and context**

The FFR programme was established through the efforts and vision of Alan McRae, a senior lecturer in the then Department of Agricultural & Horticultural Systems Management, in the Faculty of Agriculture at Massey University. Farming Systems Research and Extension (FSR&E) provided the main theoretical and practical basis for the programme (Reid, 1996), strongly influenced by Norman Simmonds (see for example 1985 ; 1986) whom McRae had met during a sabbatical at the Edinburgh School of Agriculture in the late 1980s. Also influential was the writing and work of scholars including: Robert Chambers (e.g. Chambers, 1983 ; Chambers & Jiggins, 1987a ; Chambers et al., 1989) and Janice Jiggins (e.g. Chambers & Jiggins, 1987a ; 1987b) and Niels Röling (e.g. Roling, 1988 ; Roling, 1990). The ideas on farming systems and farmer centric research argued by these scholars resonated for McRae and solidified concerns with the top down science driven model of technology transfer that he considered dominated agriculture and extension in New Zealand (McRae, 1993 ; McRae et al., 1993). In particular what was valued in FSR&E was the emphasis placed on 'the need for interdisciplinary systems analysis, a problem solving orientation and, most importantly, a consideration of the farm family, their needs and circumstances' (Byerlee et al. 1992 cited in McRae et al., 1994: n.p.).

Agriculture was undergoing significant change in New Zealand at this time. New Zealand, and in particular the agricultural sector, was adjusting to the radical central government neo-liberal reforms initiated in the mid 1980s. These now well documented policy reforms resulted in the removal of subsidies and support for farming and agriculture and the opening up of farm businesses to the international market (Sandrey & Reynolds, 1990 ; Walker & Bell, 1994). The state funded agricultural extension service was privatized, state funded research was reorganized and a competitive funding model for government public good science funding introduced with an emphasis

on funding research unlikely to be funded by non-government sources (MoRST: Science and Technology Expert Panel 1992). In the context of the dramatic changes in research and extension, McRae (1992) argued that it was unlikely any one model would be effective and there was strong evidence for the effectiveness of an approach that was farmers' needs-driven. In arguing the case for the FFR programme, McRae (1992:7) highlighted that farming systems and farmers' objectives, circumstances and constraints, were at the time 'poorly documented and even less well understood'.

Funding for the FFR programme was secured from two non-government entities (AGMARDT and C. Alma Baker Trust), to support two research officers for 5 year periods and to fund research activity within the programme.

### **Programme aim and structure**

The FFR programme established in 1991 at Massey University had the primary aim of adapting FSR and supporting its wider acceptance within New Zealand agricultural research and development (McRae et al., 1994). It was argued that the approach would 'complement traditional agricultural research in the design and testing of relevant and appropriate innovations and strategies for change in New Zealand agriculture' (McRae, 1993:109).

The programme was conceived as comprising two phases. Phase 1 involved each research officer working with 30 randomly selected sheep and beef farmers from two climatically distinct areas in the North Island: Hawke's Bay East coast summer-dry hill country and Rangitikei summer-moist hill country. Through repeated semi-structured interviews undertaken over a period of 18 months, an understanding of farmers' objectives, circumstances and constraints was gained and areas where innovation would lead to improvements in farmers' situations identified.

Phase 2 would have involved on-farm research where innovations identified from Phase 1 were trialled and adapted on-farm with farmers. It was proposed this would 'provide results to which other farmers [could] refer' but it would also 'provide useful information on the cost and support required to implement changes within the larger farming community' as well as provide evidence and information to convey the value of this approach to research institutions and funders (McRae et al., 1993:638). In initiating the programme, it was recognized that 'until research funders can see and accept the value of [farmer driven research activities], FSR will not be formally included within research institutions and programmes' (McRae et al., 1994: n.p.).

### **Phase 1 results**

Specific farm system and farm family information gathered in Phase 1, illustrated and described the complex and diverse circumstances that hill country farmers were operating under at that time (Brazendale et al., 1993 ; Reid et al., 1993 ; Brazendale et al., 1994). The findings indicated that 'farmers [were] generally more concerned with the security and well being of the farm family than they [were] with improvement in productive and economic efficiency' (McRae, 1993:109). The results highlighted that a farmer's decision to adopt, or not, a particular technology was influenced by the circumstances of the farm and farmer and a consideration of the impact of the technology on the whole farm system. Farm circumstances that were identified as influential included: level of indebtedness; stage of farm development; land capability; ownership/decision making control; and labour constraints (Reid et al., 1993).

Further findings highlighted also the rational reasons why farmers were not adopting technologies argued by science to be of benefit. A clear example was provided through the exploration as to reasons why farmers had or had not adopted heifer mating, a technology promoted at the time as a way to improve productivity and profitability. For most farmers interviewed, beef comprised only 20% of their livestock system with sheep making up the remaining 80%. For the farmers, a 20% increase in productivity and profit from the beef herd through mating heifers, did not war-

rant the greater associated risk and labour required to implement the policy (Brazendale et al., 1994).

### **Reviewing the Farmer First Research programmes' performance**

The review of the FFR programme is presented below in line with the four elements of the structural analysis of the analytical framework. The elements are interdependent and the review explores the extent to which the FFR programme was able to, or did, influence the element to develop a 'new' innovation system. In analysing the structural elements, the impact this had on the performance of the programme in achieving the functions is considered, also. At the start of each section the structural element that is the focus of that section is briefly explained.

#### **Actors**

In exploring the actor element consideration is given to the categories of actors included in the system and their roles. Actors include individuals, organisations and networks (Wieczorek & Hekkert, 2012).

The FFR programme team was small. Two full time research officers and a part time director were directly involved with a small number of advisors associated with the programme who were drawn in the main from a University environment. Those involved in the FFR programme had extensive knowledge of New Zealand farming systems and experience in working with farmers. However, at the time, there was limited formal research experience and no expertise in social science or in operationalising a FSR&E approach in the programme team. The plan had been to extend the project to include farmers and a broader mix of research expertise but this did not eventuate in the time frame of the programme. Although input from individuals including Janice Jiggins and Niels Röling was valuable and added a degree of legitimacy to the efforts of the team, the lack of experience in implementing such an approach in a 'developed' country at the time presented challenges. Others in the research community at the time were willing to be involved and adapt FSR&E to the New Zealand context; however, the limited scale and relatively short time frame of the programme meant this opportunity was not captured.

The FFR programme was championed and brokered in the main by one key individual: the director of the programme. The programme's ability to engage and enrol more actors from across a range of organisations and government was strongly linked to this individual's standing in the broader primary industry sector. The dependence on this one individual constrained the broader network of support the programme achieved and hence lack of wider legitimacy for FSR&E in New Zealand and the programme. Also, although the programme and champion had some support within the University, lack of a key supporter in senior management and organizational politics led to the departure of Alan McRae from the University and the programme. Additional funding was secured to retain one research officer beyond the five year timeframe; however, the impetus no longer remained for the programme to continue.

#### **Interactions**

Interactions refers to the relationships between actors in the system and can be analysed at the level of networks and individuals (Wieczorek & Hekkert, 2012). The limited actors engaged in, and with, the FFR programme in the 'new' innovation system defined the extent and quality of interactions that existed and were developed by the programme. Further, the limited extent of interactions and in some cases the quality of the relationship in the interaction, was a critical factor that led to the programme not being sustained longer term.

The small and narrow team involved in the programme constrained interactions and, as this paper argues, also constrained the level of innovation within the programme and ultimately the extent

of broader awareness, support and influence. The FFR programme would have benefitted greatly from the participation of other actors in and stakeholders of the innovation system present in New Zealand at the time. Collaboration from the outset would have increased the potential of broader support and importantly contributed to some early successes. As Nederlof et al. (2011:42) argues, in relation to the development of innovation platforms, examples of success are the ‘best trigger for commitment and participation’.

Wieczorek and Hekkert (2012) state that networks are not a feature of a system in the early stages of development. Rather, the authors of this paper argue that in a structural sense this may be the case in a ‘new’ system, but when the aim is to transform an existing system the nature and extent of interactions through networks and individuals to achieve a change is critical.

### **Institutions**

The context specific informal and formal rules, norms and routines that define and shape accepted and common practice relevant to an innovation system constitute the institutions (Wieczorek & Hekkert, 2012). The prevailing institutions at the time perpetuated a predominantly ‘top-down’ research approach with farmers. This was encouraged and supported by the reward structures for researchers in agriculture and the funding model at the time. The ability of the FFR programme to change existing institutions to support a FSR&E approach in the innovation system, it is argued by this paper, was dependent on gaining active engagement of actors in the broader research community, funding bodies and government. As alluded to earlier, the small and narrow group of actors involved with the programme and the nature of the interactions with potential actors would not have thought about the types of institutional changes required for the development of an innovation system driven by farmer needs. Likewise, government’s move to establish a competitive model for funding research did not provide a context conducive to the development of an innovation system driven by farmer needs.

### **Infrastructure**

Three types of infrastructure may be important for supporting the functions and hence performance of an innovation system: physical, financial and knowledge (Wieczorek & Hekkert, 2012).

The FFR programme was ineffective in stimulating any detectable change in infrastructure. The infrastructure in the innovation system in the 1990s was principally designed to facilitate a ‘top-down’ science driven model of technology development and transfer. The programme developed and published ‘new’ knowledge about farmers’ needs. However, because the programme did not progress beyond phase one, to the testing of technologies with farmers and scientists, there were no reported examples of researchers using this knowledge to complement their traditional research.

### **Implications for the Primary Innovation project**

Compared to the FFR programme, the PI project has some clear advantages that bode well for its success. The project is not reliant on one champion or broker. There is a broad network of stakeholders comprising the innovation platform that includes actors from different sectors and multiple levels but also includes researchers from multiple disciplines and organizations. The institutional context operating in New Zealand in 2013 is more accepting and familiar with collaborative approaches between organizations and with multi disciplinary work than was the case in the 1990s. Central government and key industry groups have made an initial commitment to the project and there is a broad and large community of practice with a growing familiarity with the innovation systems approach including experts who have practical experience in operationalising the approach in a developed economy.

The PI project presents an exciting opportunity to meaningful change the innovation system in New Zealand. The insights gained from the review of FFR programme strongly indicate that un-

like the FFR programme the PI project has a strong foundation for achieving significant change within the New Zealand primary innovation system.

### **Conclusion**

This paper set out to explore and describe the FFR programme and the reasons that contributed to the programme not being sustained in the early 1990s in New Zealand. Primarily what this paper argues is that the failure of the FFR programme to achieve real change in the innovation system was due in large part to its inability to alter the structural aspects of the existing system. This inability to influence was a result of the limited number of actors engaged in this change, the lack of quality interactions between actors and across broad networks combined with the difficulties in therefore gaining leverage to support changes in the prevailing institutions and infrastructure that defined the existing innovation system. The importance of good broad actor engagement is argued to be particularly critical in the early stages of a programme that aims to transform and existing dominant innovation system.

## References

- AgResearch (2012) "Project aims to boost economic success through closer look at innovation system." AgResearch News, DOI: <http://www.agresearch.co.nz/news/pages/news-item.aspx?News-id=12-12-20-1>
- Brazendale, R., Reid, J. I. & McRae, A. F. (1993). Circumstances of Two Groups of Farmers in Contrasting climatic areas of New Zealand - implications for extension? Australia-Pacific Extension Conference, 12 to 14 October, Gold Coast, Australia.
- Brazendale, R., Reid, J. I. & McRae, A. F. (1994). The On-farm Impact of Beef Production Technologies. *Proceedings of the New Zealand Society of Animal Production* 54: 413-416.
- Chambers, R. (1983). *Rural development: putting the last first*. Harlow, England, Longman, Scientific & Technical.
- Chambers, R. & Jiggins, J. (1987a). Agricultural research for resource-poor farmers Part I: Transfer-of-technology and farming systems research. *Agricultural Administration and Extension* 27(1): 35-52.
- Chambers, R. & Jiggins, J. (1987b). Agricultural research for resource-poor farmers Part II: A parsimonious paradigm. *Agricultural Administration and Extension* 27(2): 109-128.
- Chambers, R., Pacey, A. & Thrupp, L. A., Eds. (1989). *Farmer First: Farmer Innovation and Agricultural Research*. London, Intermediate Technology Publications.
- Hekkert, M. P., Suurs, R. A. A., Negro, S. O., Kuhlmann, S. & Smits, R. E. H. M. (2007). Functions of innovation systems: A new approach for analysing technological change. *Technological Forecasting and Social Change* 74(4): 413-432.
- Klerkx, L., Aarts, N. & Leeuwis, C. (2010). Adaptive management in agricultural innovation systems: The interactions between innovation networks and their environment. *Agricultural Systems* 103(6): 390-400.
- Klerkx, L. & Leeuwis, C. (2009). Establishment and embedding of innovation brokers at different innovation system levels: Insights from the Dutch agricultural sector. *Technological Forecasting and Social Change* 76(6): 849-860.
- McRae, A. F. (1992). Farmers' needs for management, research and extension, and policy - findings of a farmers' workshop in their implications. *Proceedings of the New Zealand Grassland Association* 54: 7-10.
- McRae, A. F. (1993). As applied agricultural scientists we serve....? *Proceedings of the New Zealand Society of Animal Production* 53: 107-110.
- McRae, A. F., Anderson, F. M. & Brazendale, R. (1993). Applying "Farmer First Research" in New Zealand XVII International Grassland Congress, Palmerston North, Hamilton, Lincoln, New Zealand, & Rockhampton, Australia, New Zealand Grassland Association, Tropical Grasslands Society of Australia, New Zealand Society of Animal Production, Australian Society of Animal Production - Queensland Branch, New Zealand Institute of Agricultural Science.
- McRae, A. F., Brazendale, R. & Reid, J. I. (1994). Broadening the Scope of Farming Systems Research in New Zealand Agriculture. Paper presented at International symposium on systems-oriented research in agriculture and rural development. Montpellier, France, 21-25 November 1994

- Ministry of Primary Industries (2013). Annual Report 2012/13. Wellington, MPI.
- MoRST: Science and Technology Expert Panel (1992). Long term priorities for the public good science fund: a public discussion document. Wellington, Ministry of Research, Science and Technology.
- Nederlof, S., Wongtschowski, M. & van der Lee, F. (2011). Putting heads together: agricultural innovation platforms in practice, KIT Publishers, KIT Development, Policy & Practice.
- Reid, J. I. (1996). Farming systems research: a background paper to the Farmer First research project at Massey University. Palmerston North: Massey University.
- Reid, J. I., McRae, A. F. & Brazendale, R. (1993). Farmer First Research: A review of phase one results in relation to farmers' willingness and ability to change. Proceedings of the New Zealand Grasslands Association Conference, Masterton.
- Roling, N. G. (1988). Interaction between extension services and farmer decision making: new issues and sustainable farming. Cambridge, New York, Cambridge University Press: 280-291.
- Roling, N. G. (1990). The Agricultural Research-Technology Transfer Interface: A Knowledge Systems Perspective. In Making the Link Agricultural Research and Technology Transfer in Developing Countries. D. Kaimowitz. Boulder, Westview Press in cooperation with the International Service for National Agricultural Research: 1-42.
- Sandrey, R. & Reynolds, R. (1990). Farming without subsidies: New Zealand's recent experience. Wellington, Ministry of Agriculture and Fisheries.
- Simmonds, N. W. (1985). Farming systems research: A Review. Washington, D.C., USA, The World Bank.
- Simmonds, N. W. (1986). A short review of farming systems research in the tropics. *Experimental Agriculture* 22(01): 1-13.
- van Mierlo, B., Leeuwis, C., Smits, R. & Woolthuis, R. K. (2010). Learning towards system innovation: Evaluating a systemic instrument. *Technological Forecasting and Social Change* 77(2): 318-334.
- Walker, A. & Bell, B. (1994). Aspects of New Zealand's Experience in Agricultural Reform Since 1984. Wellington, MAF.
- Wieczorek, A. J. & Hekkert, M. P. (2012). Systemic instruments for systemic innovation problems: A framework for policy makers and innovation scholars. *Science and Public Policy* 39(1): 74-87.