

# Setting up an innovation network: Public and private sector collaboration to solve pasture performance issues in the New Zealand dairy industry

Brazendale, R.<sup>1</sup>, and K. Rijswijk<sup>2</sup>

<sup>1</sup> DairyNZ, Massey University, Palmerston, New Zealand

<sup>2</sup> Wageningen University, Wageningen, The Netherlands

Corresponding author: rob.brazendale@dairynz.co.nz

## Abstract

Dairy farmers in the northern regions of New Zealand expressed widespread dissatisfaction with the performance and persistence of their pastures following drought conditions in 2007/08. Farmers were becoming disillusioned with the practice of renewing pasture as a means to introduce modern perennial ryegrass cultivars in their paddocks. This paper describes the formation and operation of an innovation network, consisting of private and public sector actors, that was formed in 2010 to improve the quality and consistency of advice provided to farmers. All parties sought to restore farmers' confidence in pasture renewal and modern cultivars, and critically, commercial interests were set aside. A series of activities were coordinated by this group from 2010 up to this date.

Data is presented that describes the interactions between actors and the impact of this innovation network in addressing pasture performance issues. Critical success factors for the group are discussed and how this network has adapted over time is also described. Results to date suggest this innovation network has been effective in addressing pasture performance issues. A broad range of stakeholders, agreeing a shared vision amongst stakeholders, having clear roles and responsibilities, and a supported governance structure were critical success factors for this innovation network. These results have been influential within DairyNZ, an industry good organisation for New Zealand dairy farmers, in providing evidence that collaborative approaches are effective and consequently are being applied more widely in the New Zealand dairy industry.

**Keywords:** Pasture renewal, innovation network, critical success factors, public sector actors, private sector actors, dairy farmers

## 1. Introduction

In the 1980s the Government of New Zealand undertook a broad program of de-regulation of the agricultural industry starting with the removal of subsidies, and continued with progressive changes in the public sector servicing agriculture. This resulted in the commercialisation and privatisation of its agricultural extension services, which up until then had been public good, and thus resulted in the separation of research and extension (Botha *et al.*, 2006; Morriss *et al.*, 2006). The fragmentation of extension services increased further as a result of legislative reforms of Producer Board powers and industry structures between 1999 and 2001 (Morriss *et al.*, 2006; Turner *et al.*, 2013). Today extension services are provided by commercial company representatives, various industry good bodies, rural advisors, local government, as well as various research institutes and funding mechanisms (Botha *et al.*, 2006; Morriss *et al.*, 2006; McEntee, 2010).

A survey of agricultural technology transfer services by the Ministry for Primary Industries (2012) in New Zealand highlighted the fragmented nature of support for technology uptake. The survey also identified that “the number of people involved in technology transfer appears insufficient to provide effective support across the primary industries. There is a need to improve the connectivity between the people involved; ensure those involved are highly skilled; attract more people into the profession; and stimulate the demand for professional services if New Zealand is to achieve its goals around economic development and environmental performance.” (MPI, 2012:19) More specifically for the dairy industry, the knowledge exchange and services depend on a few public and industry organisations (Hartwich and Negro, 2010).

Against this backdrop of fragmented extension services the dairy farmers in the northern regions of New Zealand expressed widespread dissatisfaction with the performance and persistence of their pastures following drought conditions in 2007 and 2008 (Peoples, 2011; Kelly *et al.*, 2011). Farmers had become disillusioned with the practice of renewing pasture as a means to introduce modern perennial ryegrass cultivars in their paddocks. The widespread failure of pastures was mainly attributed (by technical experts) to inappropriate management of pastures during dry conditions and incorrect choice of endophyte to protect ryegrass plants against insect damage (Kerr, 2011).

As the industry good organisation for New Zealand dairy farmers, DairyNZ sought to address pasture persistence and performance issues using a collaborative approach consisting of key public and private actors related to pasture renewal, rather than direct communication with dairy farmers through DairyNZ's consulting officers, which would mean working in isolation. A pan-industry group called the Pasture Renewal Leadership Group (PRLG) was formed in 2010 with representation from all components of the pasture renewal process, such as researchers, seed breeders, seed retailers, agricultural contractors, and farmers. Following a review in 2014, the name of the group was changed to the Pasture Improvement Leadership Group (PILG), and will be called the PILG throughout this paper. The PILG is led by DairyNZ who funds researchers and developers to attend meetings and complete work arising from PILG activity. Individuals representing commercial businesses attend meetings at their employers cost and make their contribution in kind. DairyNZ organises and chairs meetings and takes responsibility for any follow up actions agreed at the meetings (including those assigned to other businesses represented within the group). The group meets 3-4 times per year with an agenda circulated pre-meeting.

The PILG aims to restore dairy farmers' confidence and competence in the practice of renewing pasture by ensuring evidence based messages are communicated consistently to dairy farmers. The role of the members of the PILG is thus to represent their sector, not their company, and commercial interest must be set aside. The messages from PILG are therefore focused on 'how to do pasture renewal', instead of 'why do pasture renewal', as the latter would link more closely with commercial incentives of some members and potentially become a source of conflict. Thus the function of the group is to agree collectively what those messages should be and then for the respective organisations to communicate them through their already well established channels.

At the outset of the PILG formation gaps in resources and forums for communication were identified, and the PILG led initiatives to fill these gaps under the DairyNZ umbrella. This included the development of a pasture scoring scale, as well as an annual pasture competition. The latter was considered an important forum for messaging, and to celebrate farmers who were successful in renewing pastures, in that way boosting the confidence and competence of farmers.

The aim of this paper is to describe the formation of an innovation network (Ekboir, 2012) and test whether the collaborative approach used has been effective in restoring farmers' confidence in pasture renewal. Survey results are presented that give insights into the different roles and perceptions of the actors involved and how the activities of the PILG have changed over time. Based on these results critical success factors for setting up an innovation network involving public and private sector actors are identified and discussed,

## 2. Methodology

As part of the formation of the PILG a social researcher was contracted to complete various research tasks at the request of the group, primarily the formal evaluation of the effectiveness of the PILG. The social researcher also led group reflections on the functioning and effectiveness of the group.

Throughout the life of the group, data have been collected to understand the different perspectives of each of the sectors of the pasture renewal industry. The primary sources of data used for this paper are surveys, reflections of group members, as well as formal notes of the PILG meetings.

The chosen mechanism for data gathering was surveys in order to evaluate the effectiveness of the group. These surveys were available both online and in hard-copy. The reason for choosing surveys was the ability to reach a large number of potential respondents in a short amount of time and with a wide geographical area (Kumar, 2014). The respondents were identified through various methods, for example using the DairyNZ database to identify dairy farmers in the Northern regions of New Zealand, or using the PILG's network, as well as the internet, to identify seed retailers and agricultural contractors. However, one limitation of surveys is the risk of self-selecting bias as not everyone returns the survey and farmer surveys largely attract a certain type of respondent, namely older male farmers with a large amount of experience who also own the property. The inability to clarify questions, give spontaneous responses, and low response rates are also limitations of surveys (Kumar, 2014). The former two were addressed by having very clear questions and where relevant an 'other' option was included allowing respondents to fill in their own views. The latter was addressed to some extent by awarding a relevant prize amongst the respondents.

The surveys included a combination of written responses and Likert scale "tick-boxes" measuring agreement with a range of statements. Once completed, the results of the survey were entered into an excel spreadsheet. Responses to Likert scale questions were added up and divided by the number of respondents thereby generating mean scores. Responses to individual written questions were tabulated, and then subjected to a process of thematic coding by the researcher. For an overview of the gathered data since the formation of the PILG see Table 1.

*Table 1. Overview of gathered data*

Target group	Method	Year	Number of respondents
Dairy Farmers in the Northern regions of New Zealand	Survey	2010	776
PILG members	Survey	2012	12
Seed retailers	Survey	2012	42
Agricultural contractors	Survey	2013	34
PILG members	Interviews	2014	12
Dairy farmers in the Northern regions of New Zealand	Survey	2015	376

The 2010 farmer survey provided baseline data that was used to assist PILG members to understand pasture renewal issues and focus the PILG's activity on farmer needs (Kelly and Smith, 2010). This survey also provided a benchmark to evaluate impact, comparing it to the findings from following surveys such as the 2015 farmer survey.

Three non-farmer surveys were undertaken to assess the impact of the PILG initiative at an industry level. The first of these assessed the perceived value of the PILG group from the perspective of the group's members (Kelly & Mackay, 2012). A second survey looked at the transfer of information from the PILG through the supply chain, especially focusing on seed retailers (Kelly, 2012). The third survey involved an assessment of contractors in the Waikato and Bay of Plenty regions to improve the PILG's understanding of the practices around pasture persistence and performance, associated issues such as black beetle, and the role contractors have in providing advice to farmers in support of their renewal activities (Rijswijk *et al.*, 2013). In 2014 the PILG members were interviewed in order to identify enablers and barriers to communication both internally as well as externally. This information was used as input for a strategic communication plan to increase the impact of the then renamed PILG (Rijswijk, 2014).

### **3. Results**

Key results from each of the surveys are reported here to document perspectives from different stakeholder groups. The survey results were presented during the PILG meeting after which its members discussed the implications of these results for the direction and focus of the group's activities. The outcomes of those discussions were recorded in the meeting notes. The result section below therefore shows an overview of the survey results related to the role and perceptions of the surveyed groups, as well as the outcomes of the PILG discussions.

#### **3.1 Farmer Survey 2010**

The farmer survey of 2010 (Kelly and Smith, 2010) provided information which would inform the focus and the direction of the PILG, as well as a baseline to enable evaluation of the impact of interventions. The survey showed "that farmers were, on average, less confident in selecting suitable cultivars and endophytes, and more confident in making decisions 'on-farm', including the selection of seed bed preparation techniques and appropriate management techniques both in the establishment phase and in grazing management." (Kelly and Smith, 2010:9).

The survey also identified that farm consultants, seed retailers and researchers or scientists were the most useful information sources to farmers with regards to pasture renewal information, however independent organisations, such as DairyNZ were not considered important sources of advice for farmers when it came to pasture renewal practices. The survey report concluded that "commercial imperatives conflicted with consistent advice to farmers" where those who provided the advice gaining from sale of their propriety products, and that there was a lack of consistent, precise and up-to-date information across the industry (Kelly and Smith, 2010:16). This led to farmers returning to traditional 'old' methods (Peoples, 2011), particularly in their choice of cultivar and endophyte. For the PILG the survey outcomes confirmed the group's expectations of the lack of confidence in the practice of renewing pasture, and the need to ensure evidence-based messages that are not related to company brands. These findings are consistent with previous research that found farmers

relied on commercial seed sellers as their primary source of advice about pasture renewal practices (Peoples, 2011).

### 3.2 Seed Retailer Survey

A survey of seed retailers was completed in 2012 to assess their involvement in providing farmers with advice in pasture renewal, their own confidence and satisfaction with information sources, and what they saw as key emerging issues for pasture renewal and persistence (Kelly, 2012). This survey found that seed retailers were confident in advising on pasture renewal practice relating to technical information about seed selection and management (Figure 1). These results can be usefully compared to similar questions in the farmer survey, where farmers were more confident in making on-farm decisions than making decisions relating to cultivar and endophyte choice (see Kelly and Smith, 2010). This suggests complimentary decision-making between these two groups.

The survey further found that seed retailers rated seed suppliers as the most important sources of information when it came to accessing information on pasture renewal (Figure 2). These survey findings confirmed the importance of this communication channel and lead to seed retailer representation within the PILG from 2012 onwards. Seed retailers were also invited to participate directly in pasture competitions and were asked to encourage their clients to enter these competitions.

Figure 1. Confidence levels of seed retailers (Kelly 2012) and agricultural contractors (Rijswijk et al., 2013) in providing pasture renewal information

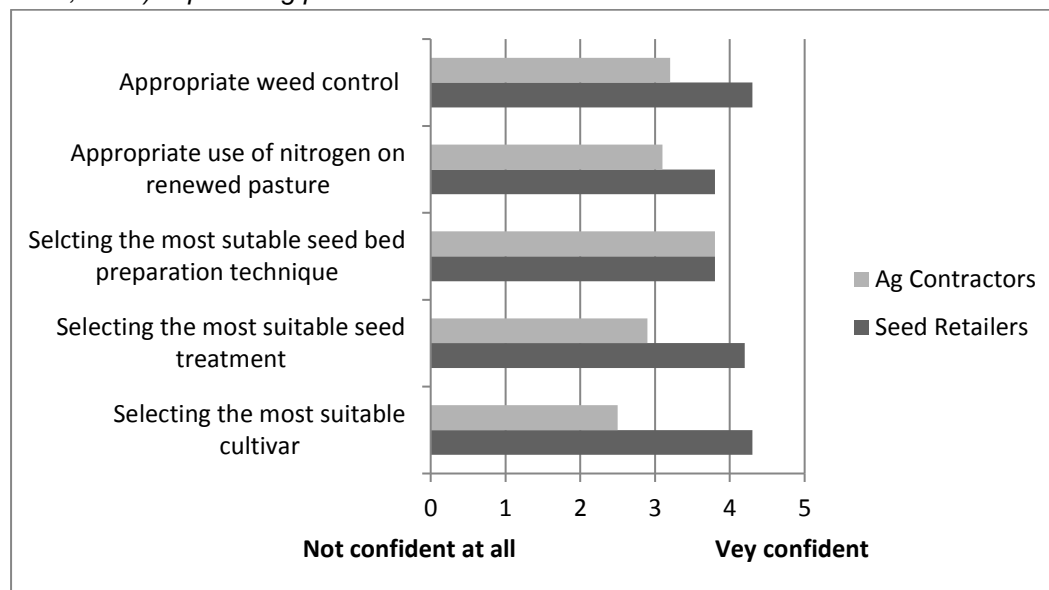
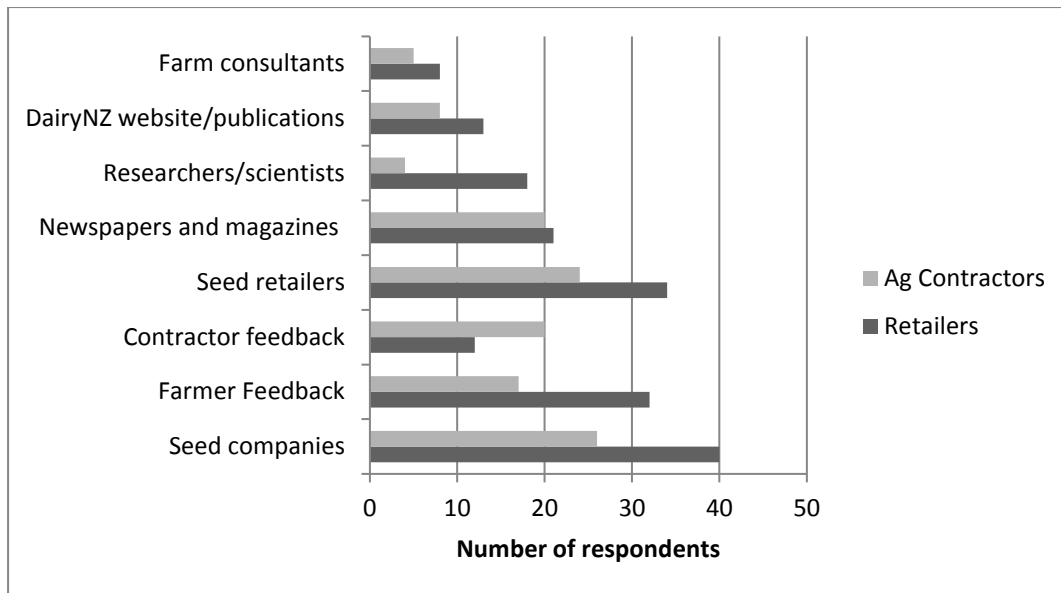


Figure 2. Information sources used by seed retailers (Kelly, 2012) and agricultural contractors (Rijswijk et al., 2013)



### 3.3 Agricultural Contractor Survey

As part of the agricultural contractor survey in 2013 (Rijswijk *et al.*, 2013) the contractors were also asked how confident they were in answering farmers' questions about a range of aspects of pasture renewal. Figure 1 shows the distribution of the different confidence level amongst contractors. Agricultural contractors were most confident answering questions about on-farm topics that relate to their everyday practices and with which they are familiar. Conversely, they had low confidence or very low confidence in answering farmers' questions about cultivar and endophyte selection. Contractors seem to be less familiar with topics that request scientific knowledge of seed specifics as these topics are removed from what they do every day as part of their businesses.

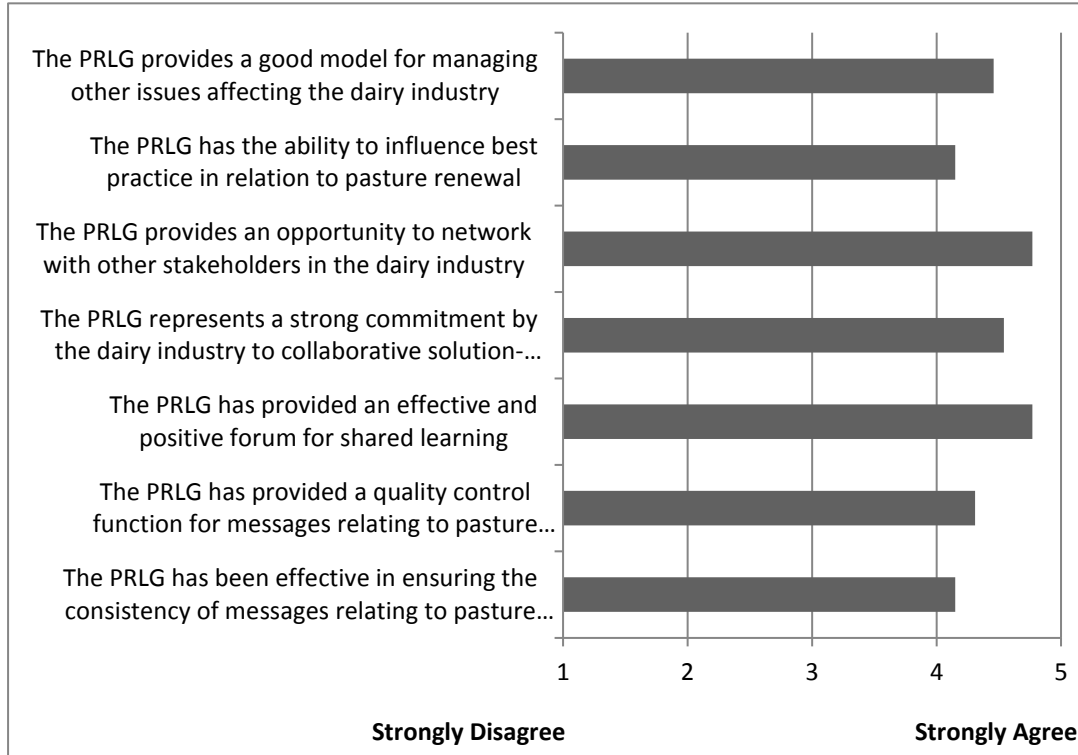
In comparison, the seed retailer survey showed that seed retailers are more confident providing this scientific information than making the on-farm decisions (Kelly, 2012). The contractors and seed retailers complement each other in providing advice and helping farmers with decision-making about pasture renewal. However, the farmer survey (Kelly and Smith, 2010) showed that farmers are confident making decisions about the same topics which the contractors are confident in providing advice.

The two most often used information sources were seed companies or seed retailers (Figure 2). More than 50% of the respondents also talked to other contractors and farmers to get feedback and information on pasture renewal, and used articles in farming newspapers and magazines as information sources. As a result of this survey the PILG directly engaged with the Rural Contractors Association and has become a regular contributor to their members' magazine. In 2013, the PILG was invited to be a key note speaker at the association's annual conference.

### 3.4 PILG Member survey and interviews

As part of an ongoing evaluation of the effectiveness of the PILG members were surveyed in 2012 (Kelly and Mackay, 2012). PILG members were asked to indicate their level of agreement with each of these statements, as presented in Figure 3.

Figure 3. Level of agreement with statements by PILG members (Kelly and Mackay, 2012)



Based on a calculation of average scores, there was agreement to strong agreement with all of the statements presented. There was particularly strong agreement with the notion that the group was a positive forum for shared learning and an excellent platform for stakeholder networking. These two factors are largely responsible for member's enjoyment and satisfaction of involvement (Kelly and Mackay, 2012).

The three relatively lowest scoring statements (although agreement was expressed for all of them), were related to the development of consistent messages relating to pasture renewal, the role of the group in providing a quality control function for such messages, and the ability to influence best practice. These results reflect many of the challenges identified in transferring technical data into useful information for on-farm decision-making (Kelly and Mackay, 2012). Despite these technical difficulties, there was strong agreement that the PILG innovation network represented a good model for addressing issues affecting the dairy industry.

In 2014 the members were again asked to assess the group's impact and effectiveness through a set of interviews that focussed on the communication, between group members and their respective organisations, and between the group and its intended audience of dairy farmers and other external parties. Group members commented that they really valued the variety of members, but that the commercial versus science debate still was very much present within the group (Rijswijk, 2014), for example in relation to deciding on sowing rates. Public sector scientists argued that seeding rates could be safely reduced without detriment to pasture performance and may in fact improve pasture persistence (see also Lee, 2013). Private sector seed suppliers saw this as a threat to seed sale volumes and argued that low seeding rates were risky because farmer establishment practices, such as seed bed preparation and weed control, were sub-optimum and high seeding rates compensated for these poor practices. Seed retailers also believed there were no detrimental effects of high seeding rates apart from extra seed costs and therefore they were 'better to err on the side of caution'.

The members had various views on the communication from the PILG with their own organisations, depending on the size of the organisation as well as resource availability. All members agreed to make a greater effort to communicate the messages from the group internally within their organisations (Rijswijk, 2014). Commercial actors within the PILG agreed to take greater ownership for the output from the group, and share the workload carried largely by DairyNZ up to this time. This was both relevant for the communication towards their respective organisations, as well as the external communication of the PILG (see below).

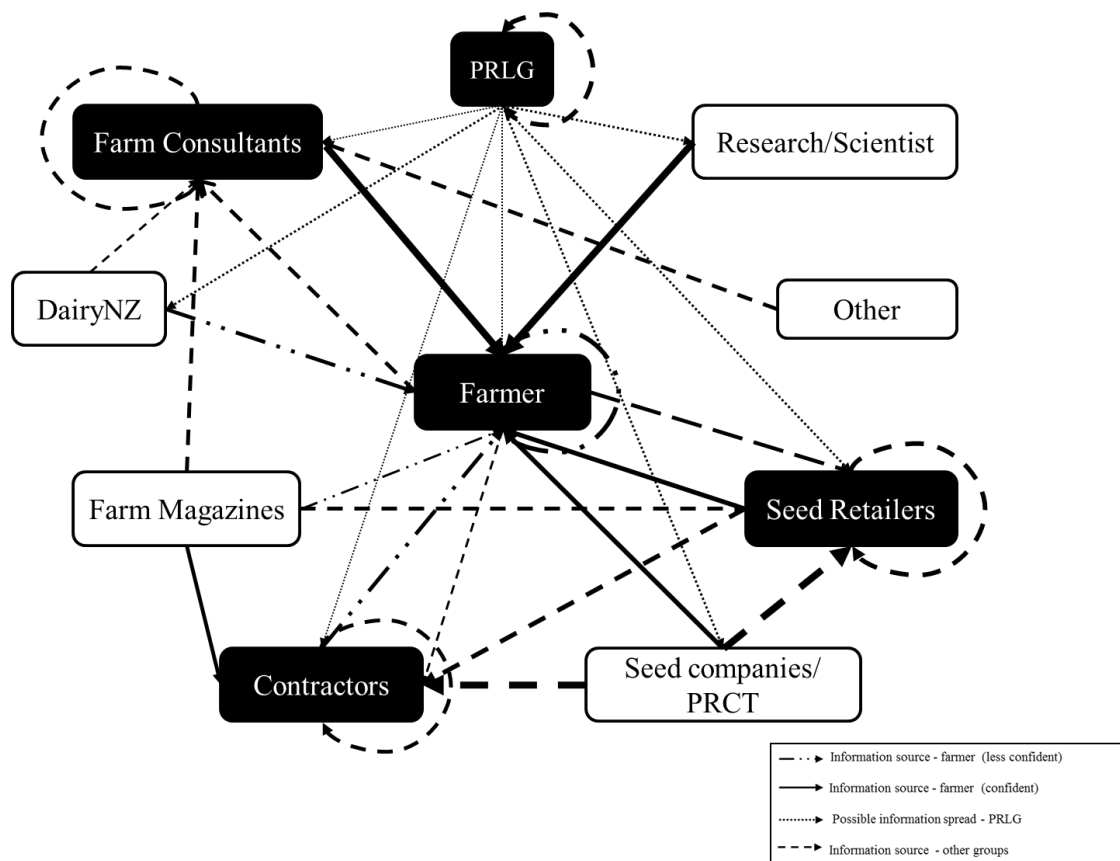
The main conclusion regarding the external communication was that it had been sufficient, according to the group members, up until that point, but that greater impact could be achieved if the communication was more structured and would reach a wider audience (Rijswijk, 2014). The group therefore decided to create a communication strategy and hire someone to manage the daily business of the group and its communication. As a result of feedback from PILG members the purpose of the PILG was extended beyond a focus on pasture renewal practices to the management of pasture for improved persistence and performance. The group also felt that this topic was relevant beyond the Northern regions of New Zealand and started to target other regions in their messaging as well.

### **3.5 Connections between survey results**

In 2013, the survey data collected by the PILG were brought together by Rijswijk (2013a), along with a farm consultant survey completed by Payne *et al.* (2010) and an independent farmer survey (Peoples, 2011). Figure 7 shows the main information sources used by each of the surveyed groups. The black boxes represent the surveyed groups. The line thickness represents the frequency of the connection for that particular group, i.e., thicker lines represent greater frequency. This figure shows farm consultants and researchers are key influencers of confident farmers. Seed companies are key influencers of both seed retailers and contractors. The indirect influence of the PILG (in the figure labelled as PRLG) is shown with lines to these key influencers. Hence, the line between the PILG and farmers is not heavy and DairyNZ, the catalyst of the PILG, was not a frequently used source of information by farmers in pasture renewal matters.



Figure 4 Information flows within the pasture renewal industry (Rijswijk, 2013a)

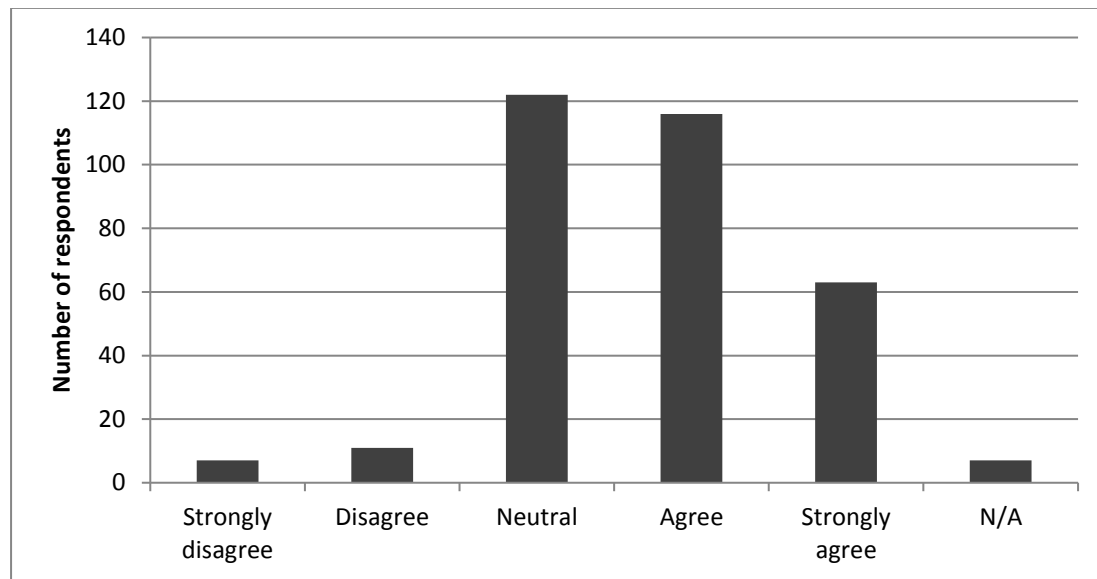


### 3.6 Farmer Survey 2015

The farmer survey of 2010 was repeated in 2015 to assess any changes in farmer attitudes to pasture renewal and their confidence in practices in pasture renewal (Rijswijk and Rhodes, 2015). The respondents indicated this time that they had more confidence in selecting the most suitable cultivars and endophytes, however, their confidence in undertaking appropriate management of their pastures had decreased a little. The information sources that were valued most by dairy farmers remained largely the same as in 2010, however, seed retailers had become the most useful source of information for the farmers instead of farm consultants (Rijswijk and Rhodes, 2015). The 2015 survey data also showed that farmers use a wide range of information sources when it came to making pasture renewal decisions (Rijswijk and Rhodes, 2015). Based on this information the PILG recognised the need to more broadly engage with other associated organisations. Organisations such as New Zealand Institute of Primary Industries Management, which is the professional body for agricultural professionals, became a particular group of focus.

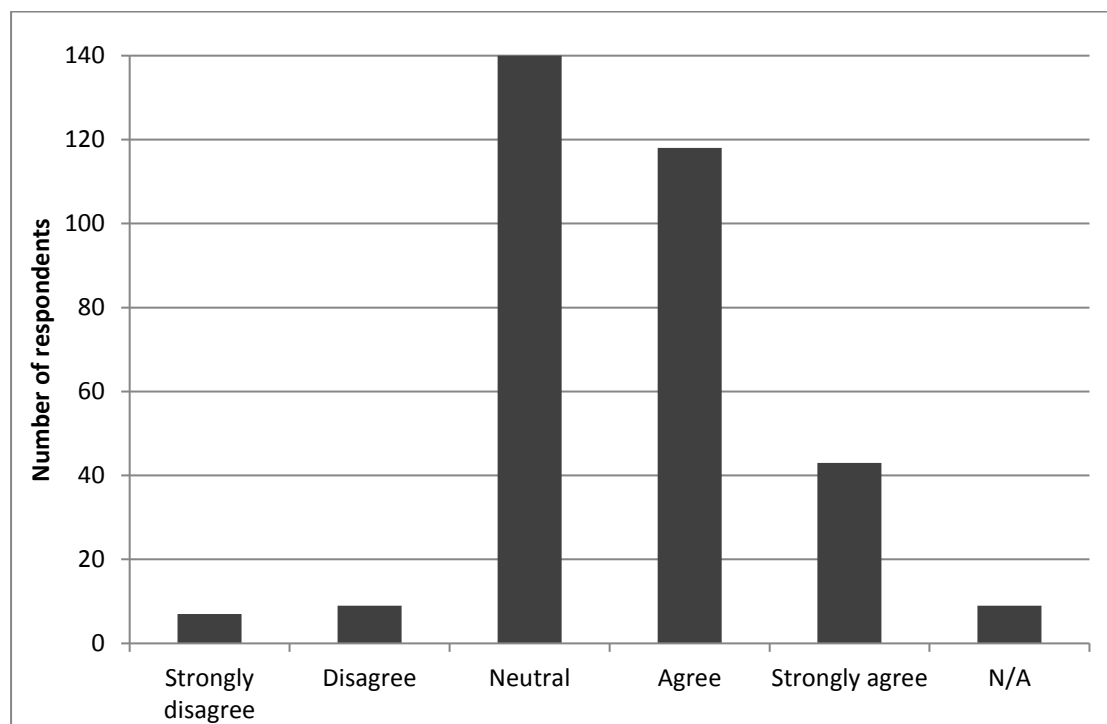
To measure change over time respondents were asked to rank their level of agreement with three statements. A scale from 1 to 5 was used going from strongly disagree to strongly agree with a not applicable option, if appropriate. The first statement was: 'compared to 2010 there is now better information available about pasture renewal'. A total of 326 respondents answered this question, although the most selected option was neutral (37%), a total of 54% of respondents either agreed or strongly agreed, as shown in Figure 5 below (Rijswijk and Rhodes, 2015).

Figure 5 Level of agreement with the statement: compared to 2010, there is now better information available about pasture renewal (n = 326) (Rijswijk and Rhodes, 2015)



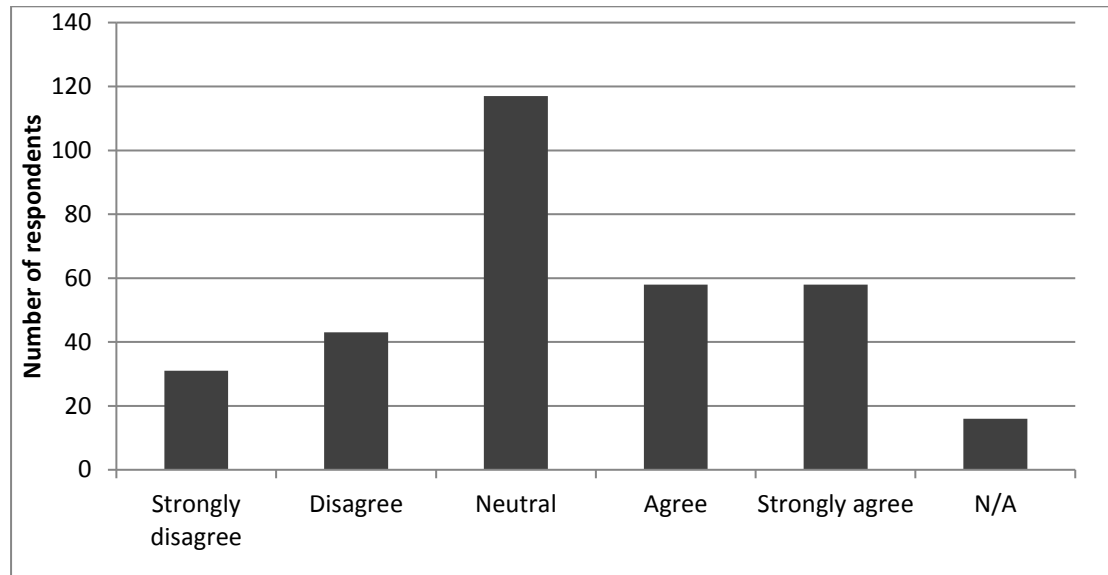
The second statement was: 'compared to 2010, the messages about pasture renewal are more consistent across the industry'. Responses are shown in Figure 6 below. Again, the most widely given response was neutral (43% of 326 respondents), but as with statement one, 49% agreed or strongly agreed with this statement. This suggests that not only is there better information available, but also that the information itself is captured in a more consistent way across the industry.

Figure 6 Level of agreement with the statement: compared to 2010, the messages about pasture renewal are more consistent across the industry (n =326) (Rijswijk and Rhodes, 2015)



The third and last statement was: compared to 2010, I have made significant changes in how I renew my pastures (Figure 7). Similar to the first two statements, there was a tendency to respond to the neutral, 36% of 323 respondents. However, for this statement the remaining replies were more evenly spread, those that agreed or strongly agreed with this statement accounting for another 36%, but 22% either disagreed or strongly disagreed.

Figure 7 Level of agreement with the statement: compared to 2010, I have made significant changes in how I renew my pastures (n = 323) (Rijswijk and Rhodes, 2015)



Overall it was concluded that the aim of the PILG to ensure consistent messages relating to pasture renewal had certainly been met, with dairy farmers being more confident in their pasture renewal practices, the improvement of availability of information and increased consistency of the messages across the industry.

#### 4. Discussion

The results report the activities of the PILG over the past 5 years and assess the impact of the group. Despite the 2015 farmer survey showing that the aim of restoring dairy farmers' confidence and competence in pasture renewal, through providing consistent and correct industry wide messaging has been met, it does not mean that this achievement was not without its challenges. This section will discuss the critical success factors for setting up an innovation network which Ekboir (2012) describes as a diverse group of agents who voluntarily contribute knowledge and other resources to jointly develop or improve a social or economic process or product. Innovation networks are a special form of organization with a non-hierarchical structure, a collaboration-based culture, consensus-based coordination (because members are free to leave the network at any time)..

The PILG was set-up as an innovation network and formed in response to farmer dissatisfaction with the performance of pasture. There was widespread concern within the seed industry that farmers were losing confidence in their product and poor pasture persistence was being linked to modern cultivars (Kelly *et al.*, 2011; Peoples, 2011). This emerging crisis of confidence provided the first critical success factor, namely a sense of urgency for action and willingness of competing commercial interests to work together to find solutions for the industry. Further, at the first meeting held in August 2010 a shared vision was agreed amongst group members: "To restore dairy farmers' confidence and competence

in pasture renewal". This shared vision proved to be very important to the ongoing function of the group as it provided common focus and ownership amongst group members.

A third success factor in the set-up of the PILG was the representation of all actors in the pasture renewal process. This was important because messages were agreed that were workable for all sectors not just selected components. This reduced the likelihood of messages communicated from public sector actors being in conflict with private sector actors. At the time of forming this innovation network such an approach was novel for DairyNZ. Since its formation this has become a more common approach where DairyNZ acts as a catalytic agent to effect change for the benefit of dairy farmers.

At the outset of the group the roles and expectations of actors were clearly articulated. Individuals were there to represent their sector not their company and commercial interest must be set aside. This proved to be the fourth success factor, as group members were required to agree on key messages for farmers about pasture renewal. Once these key messages were agreed all organisations directly involved (commercial and non-commercial) and associated organisations would communicate these messages through their own commercial channels. Despite these agreements tensions in the group sometimes occurred, often related to differences between commercial and science perspectives, such as the seeding rates issue mentioned above. The way this conflict was resolved in the short term by referring to an agreed key principle; that the group should be evidence-based. The outcome was a position statement (PILG, 2014) agreed by the group while a trial was conducted to test the effect of seeding rate on pasture persistence). Interestingly, the trial found that seeding rate did not affect persistence and concurred with seed retailers' beliefs.

Another success factor was governance of the PILG, which is fulfilled by DairyNZ, who prepares the agenda and chairs the meetings. The impartiality of DairyNZ appears to be important to group members, Chair options have been considered by the group but continuing with DairyNZ in this role has been the unanimous decision. Furthermore, members believed that under DairyNZ leadership the PILG had greater credibility amongst farmers compared with other commercially driven groups. Also, the involvement of a social researcher in the PILG is important to its success, as the social researcher provided discipline to group reflection and ongoing evaluation of the group's effectiveness. Attendance at meetings provided context and understanding when carrying out survey work on behalf of the group.

An example of this ongoing evaluation is the information flow within the pasture renewal industry which was collated from survey data and depicted in Figure 7 (Rijswijk, 2013a). This diagram was presented to the PILG and led to discussions within the group whether or not the PILG should have its own brand and communication channel. Initially the communication model was set up to be indirect, using members' organisations communication channels, with the PILG deliberately having low brand awareness amongst farmers for several reasons: i) the group did not want to add to the confusion of farmers by creating yet another source of information; ii) it would be a considerable investment of time and money to do this properly; iii) previous research and subsequent survey work conducted by PILG confirmed that organisations actors represented already had very well established communication channels that were recognised by farmers and other stakeholders; iv) because the group was newly established, using a relatively new approach in 2010 to deal with this communication problem around pasture renewal it was uncertain whether this approach would work; and v) the credibility of the group, despite being led by DairyNZ, was uncertain. Even though some of these initial reasons were less relevant in 2013 the group decided that it would continue in the same way, without having a brand or a separate communication channel. The appearance of messages and resources developed by the PILG in commercial publications (such as

Klingender, 2016) provides some evidence that the communication model is working as do the 2015 survey results (Rijswijk and Rhodes, 2015)

Following the 2013 review the earlier mentioned communication strategy (Rijswijk, 2014) was set up, which in turn resulted in associated organisations being identified that could extend messages on behalf of PILG, despite not being directly involved in the PILG. These organisations included other seed companies and New Zealand Institute of Primary Industries, the professional body representing agricultural professionals, including farm consultants.

The 2015 farmer survey data above suggests that this communication strategy is working.. Farmers are more confident about pasture renewal and believe information sources are more consistent. While not all this progress can be attributed to the PILG alone it at least provides some confidence that the outcomes sought are being realised. Moreover it is a good indication that the formation of this innovation network was successful, as the structure is very much appreciated by its members, but also achieving the impact they were after.

## **5. Conclusion**

The 2015 farmer survey found that farmers' confidence in pasture renewal had increased and provides some evidence that the PILG is having the desired impact. The appearance of messages and resources developed by the PILG in commercial publications gives some confidence that the communication model is working.

Significant opportunities exist to improve the effectiveness of the PILG further through the influence of farm consultants who are a primary source of information for farmers (Peoples, 2011; Rijswijk, 2013b). Furthermore "targeted messages to contractors and seed retailers would enhance their knowledge of pasture renewal practices, thus improve their confidence levels in both practical and scientific aspects of pasture renewal, and enable them to give better advice to farmers." (Rijswijk, 2013b:224).

The set-up of the PILG proves that public and private actors can work together effectively to form an innovation network, provided that there is i) a sense of urgency and willingness to work together; ii) a broad representation of the involved or affected stakeholders; iii) the members share a common vision; iv) members are able to put commercial interests aside; v) have a clear view of their roles and responsibilities; vi) there is a accepted governance structure; and vii) regularly reflect on their effectiveness. This network was formed in response to farmer dissatisfaction with their pastures and commercial actors recognised this threat to their future product sales. The absence of formal organisational arrangements from their own companies the group has had sufficient flexibility to adapt over time and broaden its scope beyond pasture renewal to pasture performance and indeed change its name to reflect this change.

Data collected to date suggest this innovation network has been effective in increasing confidence amongst farmers around pasture performance issues through collaboration between private and public sector actors. These results have been influential within DairyNZ in providing evidence that collaborative approaches are effective and consequently are being applied more widely in the New Zealand dairy industry to address complex issues, such as the industry's impact on water quality.

## **Acknowledgements**

Funded by New Zealand dairy farmers through DairyNZ. The authors wish to acknowledge all past and present members of the PRLG and PILG.

## References

- Botha, N., Coutts, J., & Roth, H. (2006). *The role of agricultural consultants in the New Zealand Research, Development and Extension system*. Paper presented at the New Zealand Agricultural and Resource Economics Society conference, Nelson, 24-25 August 2006.
- Klingender, J. (2016). *Old and new cultivars face off*. Ravensdown Ground Effect p14-15 Autumn 2016 Edition 2
- Hartwich, F., & Negro, C. (2010). *The role of collaborative partnerships in industry innovation: lessons from New Zealand's dairy sector*. *Agribusiness* 26(3): 425-449.
- Ekboir, J. (2012). *How to Build Innovation Networks. Module 1. Coordination and Collective Action for Agricultural Innovation. Thematic note 2*. In: *Agricultural Innovation Systems: An investment sourcebook*. International Bank for Reconstruction and Development / International Development Association or The World Bank.
- Kelly, S., Smith, E. & Brazendale, R. (2011). *Pasture renewal in the Waikato and Bay of Plenty regions: An overview of farmer practice, experience and attitudes*. in Mercer, C (ed.), *Papers from the Pasture Persistence Symposium (2011 Hamilton, New Zealand)*, Grassland Research and Practice Series No. 15, p.21-24 (ISSN: 0110-8581).
- Kelly, S., & Smith, E. (2010). *Pasture Renewal in the Waikato and Bay of Plenty Regions*. Client report prepared for DairyNZ by AgResearch Ltd., New Zealand.
- Kelly, S. (2012). *Assessing the impact of Pasture Renewal Group: results summary of frontline seed retailers survey*. Client report for DairyNZ by AgResearch Ltd., New Zealand
- Kelly, S., & Mackay, M. (2012). *Assessing the impact of the Pasture Renewal Leadership Group: member feedback survey*. Client report prepared for DairyNZ, by AgResearch Ltd., New Zealand
- Kerr, G.A. (2011). *Committee Chairman's Introduction*. Pasture Persistence Symposium: New Zealand Grassland Association. Grassland Research and Practice Series 15, p1. 10th and 11th May 2011. Hamilton, New Zealand
- Kumar, R. (2014). *Research methodology: a step-by-step guide for beginners*. Fourth Edition. London, Sage Publications.
- Lee, J., Thom, E., Chapman, D., Wynn, K., Waugh, D., & Rossi, L. (2013). *Ryegrass seeding rate alters plant morphology and size – possible implications for pasture persistence*. Proceedings of the 22<sup>nd</sup> Grasslands Congress. Sydney Australia.
- McEntee, M. (2010). *More carrot and less stick: lessons from agricultural extension in New Zealand*. In 8th World Congress of Participatory Action Research and Action Learning, 6th-9th September, Melbourne Australia

Ministry for Primary Industries. (2012). *Survey of technology transfer services to farmers and growers in New Zealand*. Report by the Ministry for Primary Industries, Wellington.

Morriss, S., Massey, C., Flett, R., Alpass, F., & Sligo, F. (2006). *Mediating technological learning in agricultural innovation systems*. *Agricultural Systems* 89(1): 26-46.

Payne, T., Kelly, S., Bewsell, D., MacKay, M., & Roth, H. (2010). *More 'reach' through farm consultants*. Client report prepared for DairyNZ, by AgResearch Ltd, New Zealand.

Pasture Improvement Leadership Group. (2014). *What is the 'correct' perennial ryegrass sowing rate*. A position statement document prepared for DairyNZ Ltd, New Zealand

Peoples, S. (2011). *Perplexed Pasture Renewal Practitioners: The Perennial Problem Technology Adoption and the Role of Networks in Dairy Farming*. A report prepared for FORST and DairyNZ by AgResearch Ltd, New Zealand.

Rijswijk, K., Ruppert, K. & Payne, T. (2013). *Assessing the impact of the Pasture Renewal Leadership Group: Results summary of the contractor survey*. Client report prepared for DairyNZ, by AgResearch Ltd., New Zealand

Rijswijk, K. (2013a). *The Status of Pasture Renewal Practice: Knowledge, Information and Communication*. Client report prepared for DairyNZ. AgResearch.

Rijswijk, K. (2013b). *Interactions between players in the field of pasture renewal*. *Proceedings of New Zealand Grasslands Association Conference 75*: 221-225. Tauranga, New Zealand.

Rijswijk, K. (2014). *Pasture Renewal Leadership Group Communication Strategy*. Client report prepared for DairyNZ by AgResearch Ltd., New Zealand

Rijswijk, K., & Rhodes, H. (2015). *Pasture renewal in the Waikato and Bay of Plenty regions: a comparison between 2010 and 2015 farmer surveys*. Client report prepared for DairyNZ by AgResearch Ltd., New Zealand

Turner, J., Stevens, D., & Rijswijk, K. (2014). *Revitalising the role of rural professionals in primary sector innovation*. *Primary Industry Management* 18(1): 21-24.

Turner, J.A., Rijswijk, K., Williams, T., Barnard, T., & Klerkx, L. (2013). *Challenges to effective interaction in the New Zealand agricultural research and extension system: an innovation systems analysis*. *Extension Farming Systems Journal* 9(1): 89-98.