

# Who Do Farmers Talk to? How Farmer to Farmer Social Interactions Shaped Dairy Farmers' Responses to Water Quality Interventions

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**Abstract:** This paper explores how farmer to farmer social interactions shaped dairy farmers' responses to water quality interventions in New Zealand. New Zealand's freshwater quality is declining, and dairying is one identified contributor to this decline. As a result, the dairy industry, and central and regional government, progressively introduced a range of water quality interventions, including voluntary industry accords, economic subsidies, education, and regulatory controls over farm management practices. The Manawatu-Wanganui Region, governed by Horizons Regional Council, was the site for this single-case study research. Horizons introduced regulatory controls over dairy farm management practices (the One Plan), and farmers felt resentful at a disregard of their autonomy and the lack of respect shown toward farmers. Conflict between farmers and the regulator ensued, trust was reduced, and reduced trust led to farmers challenging the information provided by the regulator and the scientists informing the regulator. As a result, farmer to farmer social interactions became significant for information flow, and a way for farmers to discuss the potential impact of regulation on their farm businesses. Farmer to farmer social learning contributed to farmers accepting that practice change is required to reduce the impact of dairy farming on water quality. Farmer to farmer social interactions were pivotal for these dairy farmers to understand, manage and adapt to enforced change.

**Key words:** Social learning, response, policy intervention, water quality, social norms, trust.

## Introduction

The quality of New Zealand's streams, lakes, rivers and aquifers is declining, and dairying is one identified contributor to this decline (Smith et al. 1993, Parkyn et al. 2002, Parliamentary Commissioner for the Environment 2013). In response to scientific evidence and increasing concern about declining freshwater quality in New Zealand, the dairy industry and government progressively introduced a suite of water quality interventions to influence dairy farm management practice.

The dairy industry introduced two successive voluntary accords (DairyNZ and DCANZ 2013), and these accords list the good management practices dairy farmers are expected to adopt. New Zealand's largest dairy company, Fonterra, introduced an education programme (Supply Fonterra) that supports and encourages dairy farm practice change in order to improve environmental performance (Fonterra 2013) - in addition, interventions were introduced by both central and regional government. Central government developed a national policy for managing freshwater (Ministry for the Environment 2014), and this policy guides regional government (regional council) policy. At a regional level, the eleven regional councils in New Zealand are responsible for freshwater management and planning in their region. Regional councils use a mix of policy interventions (e.g. regulation, incentives, education, voluntary strategies) to achieve their community's desired objectives for water quality.

Horizons Regional Council manages freshwater quality in the Manawatu-Wanganui Region, and this region was the study site for this research. The Manawatu-Wanganui Region is a recognised dairying region (LIC 2015) and has a recognised freshwater quality issue (Horizons Regional Council 2013). Horizons notified the Proposed One Plan (POP) in 2007, to address declining regional water quality (among other issues). The One Plan became operative in 2014 (Horizons Regional Council 2014). The One Plan takes a regulatory

approach to managing diffuse discharges to water, or discharges that do not have a single point of origin, for example, pollutants from agricultural or urban land that are carried into water through leaching or run-off (Ministry for the Environment 2007).

Adopting regulation to manage diffuse discharges to water (the One Plan) was a relatively new approach for Horizons and for water management in New Zealand. The One Plan uses a targeted approach to water management, and divides the region into targeted and non-targeted water management zones (WMZ). In targeted WMZ, rules and regulations control existing (and new) intensive land use activities (such as dairy). Farmers in targeted WMZ must apply for a Land Use Consent, and this consent sets out the farm practice changes they will make to reduce nitrogen leaching from their farms over time. Farmers in a non-targeted WMZ do not need to apply for a Land Use Consent, and their farm practices are not regulated. Farmers and farming organisations were surprised and concerned by Horizons' regulatory approach to water management, because they expected a voluntary intervention similar to what Horizons used in the past. This paper explores dairy farmers' responses to a shift to regulation, and in particular, how farmer to farmer social interactions shaped dairy farmers' responses to the One Plan. The theoretical framework used in this study is initially presented, followed by the case-study research design used, results, discussion and conclusion.

### **Theoretical framework**

Social interaction between farmers, argue Blackstock et al. (2010), is an effective way for farmers to share ideas and create knowledge. Social interaction is the heart of social learning, and as Reed et al. (2010) simply summarised, social learning occurs when 'the message is spread from person to person through social networks'.

The social learning literature is diverse, and social learning is defined, understood and used in many ways (Rodela 2011, Reed et al. 2010, Harvey et al. 2013). Some scholars argue social learning is the formal and informal individual learning (knowledge creation) that takes place through social interaction (Oreszczyn, Lane, and Carr 2010, Reed et al. 2010, Rodela 2011). Other scholars believe social learning is a process of social change (Reed et al. 2010, Rodela 2011). These scholars argue that individuals learn from each other, make decisions that shape wider society (wider than the individual), and enhance socio-ecological systems (coupled systems of human and nature). Reed et al. (2010, p.6) combined these two perspectives and defined social learning as 'a change in understanding that goes beyond the individual to become situated within wider social units or communities of practice through social interactions between actors within social networks'.

The empirical literature presents many studies of farmer social learning, and in particular, social learning about agri-environmental and natural resource management issues. Many of these studies report social learning between farmers and others in an organised group format, such as collective agri-environmental schemes (e.g. Mills et al. 2011), field days (e.g. Lankester, Valentine, and Cottrell 2009), group activities (e.g. Cotching, Sherriff, and Kilpatrick 2009), and Landcare groups (e.g. Sobels, Curtis, and Lockie 2001). Mills et al. (2011) in particular, identified the group characteristics that contributed to the success of social learning among the farmers in their study: existing trust and norms of reciprocity between group members, and a desire to make group decisions and retain group autonomy. Mills et al. (2011) also described the 'collective efficacy' evident among the farmers in their study, whereby farmers felt that collectively changing practice would have a greater positive impact on the environment.

Social interaction between the farmers in these empirical studies provided emotional support. Observing the land degradation on other farmers' farms, and talking with other farmers, provided an opportunity for farmers to share common problems and experiences (Sobels, Curtis, and Lockie 2001). Importantly, social interaction enabled farmers to share knowledge, and develop understanding through a social learning process. Social interaction contributed to a surface level change in farmer awareness, a deeper level change in individual farmer understanding, and a change in individual and collective farmer behaviour. Individual farmer behaviour change in these studies included adopting a new farm practice, and other actions, such as trialling and monitoring new farm practices 'to see if there was any difference' (Lankester, Valentine, and Cottrell 2009, Cotching, Sherriff, and Kilpatrick 2009). Increased individual farmer understanding about the problem, contributed to a collective change in what is considered accepted and expected farm practice, and the adoption of new farm practices. For example, Mills et al. (2011) found that a change in farmer understanding about sustainable land management, resulted in farmers questioning existing farm practices, and the adoption of new farm practices (e.g. de-stocking).

Empirical research highlights how individual farmer behaviour is influenced by collective social norms, or, others' expectations of behaviour. Social interactions through social networks foster existing norms of behaviour, and encourage the development of new practice norms, which Minato, Curtis, and Allan (2010) described as accepted and expected farm management practices. Minato, Curtis, and Allan (2010) found social interactions through a Landcare group reinforced existing social norms, and enabled farmers to informally sanction (through criticism, gossip, ostracism) farmers who violated social norms. In addition, new ideas and information were disseminated through social networks, and new information was the catalyst for new practice norms being formed and becoming accepted practice.

## **Method**

This qualitative research was conducted in 2015 in the Manawatu-Wanganui Region, using a case-study research strategy (Stake 1995). A single-case design was chosen for this research, because of the complexity of the case (dairy farmers' responses to water quality interventions) and the detailed data required to answer the research question. The Manawatu-Wanganui Region is large and geographically diverse, and as such, the Upper Gorge Water Management Zone (WMZ) (contains both targeted and non-targeted subzones) was selected as the research site.

Document collection and in-depth semi-structured interviews (O'Leary 2014) with dairy farmers and key informants were the main data collection methods. The documents included legislation and submissions, planning documents, statistics, media articles, technical reports, educational materials, and industry surveys. Twelve dairy farmers were interviewed based on a stratified random sampling strategy (O'Leary 2014). Questions were asked about the current farm system, farm system changes made in the past five years, water quality interventions, relationships with others, and what constitutes a 'good dairy farmer'. To ensure anonymity, a fictitious name was used for each farmer. Key informants in this research, were participants who were able to provide relevant information, knowledge, and a deeper insight into the problem (O'Leary 2014). Nine key informants were interviewed based on snowball sampling (Robson 2011), and included a range of roles (working with farmers, to developing policy, to executive level), and organisations at regional and national level. Questions were asked about the participant's personal involvement with water quality interventions, contact with dairy farmers, and their relationships with others. A fictitious name was used to ensure anonymity. A holistic iterative narrative analysis method (Riessman 1993) was used for data analysis.

## Results

The farmers in this research interacted and formed relationships with a diverse range of individuals. In relation to farming and water quality, farmers talked with: other farmers, family, friends, fellow church parishioners, farm systems consultants, nutrient management consultants, fertiliser company sales staff; staff from Horizons Regional Council, DairyNZ (industry organisation funded through dairy farmer levies), Fonterra (milk company) and Federated Farmers (national farmer advocacy organisation); leaders of a community action group (CAG) that formed in opposition to the Proposed One Plan; and agricultural professionals (e.g. farm accountant). This paper focuses on the social interactions between farmers. The farmers and key informants reported here have fictitious names.

### *The diversity of social interactions between farmers*

The social interactions between farmers in this research were diverse. All farmers in this study interacted with other farmers, although some interacted with more farmers than others. These farmer interactions included farming family members, farmers in close proximity (e.g. a neighbour), farmers in the same geographical community, farmers who farm elsewhere in the Manawatu-Wanganui Region, or farmers from another region in New Zealand. All farmers in this study farm with family members: a spouse, children, parents, an uncle, and in-laws. Three farmers are sharemilkers, another is in an equity partnership, and these farmers interact with their respective farm owner(s).

Farmers talked with farmers at a range of venues and occasions. The farmers in this study talked with other farmers at organised events (e.g. meetings, discussion groups), social occasions ('*down at the pub*' – Roy), sports events ('*on the sideline at rugby*' – Jim), school, church, farming events (e.g. field days, farming competitions), while on holiday, and informally (e.g. while passing on the road). In respect to farming and water quality, farmers discussed the One Plan, the potential impacts of the One Plan on their businesses and the local community (e.g. changes in stocking rate, impact on farm value and farm sales), and the farm management practices that influence water quality. These conversations were related to and part of farmers' general conversation about farm production.

The farmers in this study talked more often with their neighbours, and their neighbours' beliefs and opinions can influence or reinforce their own beliefs and opinions. Ken, a third-generation farmer on the farm his grandfather farmed, often talks with his '*neighbour up the road*', and comments: '*[Farmer] will often just wander down here and find out what I'm doing up the paddock*'. Ken farms in a non-targeted water management subzone (WMSZ) (does not require a Land Use Consent), and his opinions of how the One Plan will impact on farmers were formed from his discussions with his neighbour who farms in a targeted WMSZ (requires a Land Use Consent). Ken is upset. He believes Horizons Regional Council are '*picking on*' and trying to control farmers by telling them what they can and can't do on their farms: '*they're [Horizons] clamping down on him [his neighbour] at the moment*'.

Some farmers interact with other farmers through an employment relationship (boss-worker and farm owner-sharemilker). Stu's belief that stream fencing is '*common-sense*' to improve water quality, was influenced by a previous boss's proactive attitude towards fencing: '*We're fencing now, we can do the bare minimum or we can future proof, let's do it all now*'. When he was a farm worker, Stu also remembered how he chose to work for a farm owner because of this individual's industry connections ('*I didn't have many contacts at the time*') and his reputation ('*he's a rock star*'). Among other topics, Stu learnt about the POP: '*he was always coming back with more and more information about it [POP]*'.

Three farms in this study were sharemilker-owner businesses, and the farm owners have an expectation that their sharemilkers' farm management practices will not impact negatively on

water quality. Sharemilker Stu, for example, is responsible for the operational decisions about farm dairy effluent application on the farm owned by Ken, and it is important to Ken that effluent is correctly applied (*'not in the water system'*). When Stu started on Ken's farm, they talked about 'good practice' – as Ken put it, *'where the irrigator's allowed to go'*. Ken and Stu *'talk most days'* about what's happening on the farm, and believe they have a good relationship, which in Ken's opinion, is based on mutual respect and regular communication. But – if Stu *'made a muck up with the effluent'* ('poor practice'), Ken would not want Stu working on his farm because Stu's actions would contradict Ken's personal values of water care: *'I'd be very upset if some pollution came off my property. Being an old trout fisherman, I don't like seeing rivers getting polluted.'*

Other farmers in this study talked about the 'good farmers' or 'good dairy farm' practice around water quality. Good dairy farms have a lower nitrogen leaching compared with other farms, and in Steve's words: *'I think we're about 14 or something, or 18, which he [fertiliser rep] said was actually damn good'*. In contrast, some farmers talked about 'poor' dairy farm practice. Roy thinks high nitrogen leaching is bad, he's heard about *'some of the top ones in Taranaki or Canterbury that use lots of nitrogen'*, and he thinks excessive nitrogen use should stop. Jim went to a local focus-farm field day about nitrogen leaching, and believes the focus farmer's nutrient management practices (*'brings in lots of supplements'*) and effluent infrastructure (*'unlined effluent pond'*) were behind what is accepted 'good' farm practice. This field day was a validation for the 'good' farm practices Jim uses on his farm, and he reckons: *'I'm ahead of his [focus farmer's] game.'* The farmers in this research talked amongst themselves (gossiped) and at times directly criticised other farmers' 'poor' farm practices. Ian remembered how his neighbour rang him once about an effluent spill from his farm that flowed into his neighbour's creek, and the neighbour scolded *'that's not good enough'*. Farmer to farmer interactions in this research were diverse, and these interactions were pivotal for support, information, and knowledge when Horizons notified the POP: an unexpected regulatory approach to water management.

### ***Notification of the Proposed One Plan: a regulatory approach to water management***

Horizons publicly notified the Proposed One Plan (POP) in 2007. Recalling when the POP was notified, the farmers in this study remembered feeling surprised and concerned at Horizons' regulatory approach. Prior to the announcement, farmers expected Horizons to continue with the voluntary approach they used in the past. Many farmers interviewed related that by introducing rules, Horizons were telling farmers how to farm: *'you have to cut this and reduce that'* (Max) and Horizons were *'forcing them [farmers] to cut down stock numbers'* (Ken). Roy felt Horizons *'were running around like enforcers'*. In particular, some farmers felt Horizons did not have the experience or knowledge to dictate farm practice. In Paul's opinion *'they [Horizons] didn't know what they were talking about'*. Some farmers did not take Horizons' regulatory approach seriously, and Tom remembers other farmers saying: *'like hell, that's not going to happen'*.

Almost all farmers in this study described their strong negative emotions and resistance to what they saw as controls over farm practices. The farmers used words like concerned, worried, frustrated, annoyed, disgusted, upset, shocked, frightened and scared to describe how they felt. Doug (a farmer and leader of the community action group – CAG) remembers how he and other farmers felt about Horizons' approach after the POP was notified:

*'The culture of Horizons was you'll do as you're told, we know what we're doing and if you don't do it right we'll nail you, seemed to be the way. How did the farmers feel about that? Very aggrieved, bugger [Horizons], I don't want to be told what to do, they can't tell us we're going to have to do all of this, who do they think they are?'*

Many farmers in this study felt Horizons had not consulted with them, and they felt unaware of the POP (*'we didn't know it was being developed'* - Max). Paul remembered how he thought Horizons were telling farmers what to do, rather than consulting with or caring about farmers:

*'[Horizons] just told everyone what we had to do, and they didn't really consult – they might have thought they did, but it was more oh you're going to have to cut your stocking rate, cut back on your fertiliser, we don't really care if it's going to affect you economically or anything like that, that's what you're going to have to do.'*

### ***Learning about the Proposed One Plan***

After the POP was notified, a number of farmer meetings were held. Federated Farmers, DairyNZ, Fonterra and Horizons' staff either organised the meetings or were in attendance. The farmers listened to the questions being asked, heard other farmers' concerns and opinions of the plan, and observed other farmers' reactions towards the staff present. Some farmers were unable to attend a POP meeting, and relied on other farmers for information about the event and about the plan. Stu was unable to attend a meeting (*'the boss had to go, someone had to milk'*), yet his words (*'we'* and *'I know'*) described the event as if he had personally attended. Stu's boss's recollection of the meeting shaped Stu's beliefs about the meeting. Stu described the strong farmer turnout (*'it was a big meeting'* and *'the whole region, everyone, there was a lot of farmers'*), and the purpose (*'how we can tackle the issue'*). Stu's boss's recollection also shaped Stu's beliefs about how the One Plan will impact on farmers. Stu described how other farmers felt, and their concerns: *'I know some farm owners felt of the opinion that they might as well sell the farm and piss off to the beach because they feel like there's no future in what we're doing'*.

Horizons' staff also talked to farmers at discussion group meetings. Stu remembered a guest speaker they had at a discussion group meeting when the POP *'first came in'*. The farmers were angry, and Stu thought the other farmers were just *'arguing and taking the piss'* and not listening to what the speaker was saying about the plan.

A local community action group (CAG) formed in 2013, to raise community awareness about the negative economic impacts of the POP on the local community. The CAG ran a series of public meetings, Roy and Jim went to one of these meetings, and they share what they learnt:

*'I went along to one of them [a meeting], and they [CAG] just used all the facts, what it's going to cost the local economy, local businesses. A lot of the local businesses opposed it, just people who relied on the dairy industry and said this is just unacceptable.'* (Roy)

*'I remember [local farmer] spoke, and he spoke up there, and he said to the businesses in [local town], he says, "This is what this One Plan's going to do for our farm, but we'll survive, we'll survive because we'll change, and we'll have to survive." But he said, "I don't know if you'll survive." They all looked at him, and he says, "Well we won't be coming to town to buy a car, we won't be buying tractors, there'll be no money for that."'* (Jim)

Ross, who works for DairyNZ, went to several of the CAG-run public meetings. From what he saw and heard at the meetings, he believes that as the farmers learnt about the POP, they felt empowered and increasingly comfortable to ask questions and challenge Horizons:

*'People started to learn, and once people started to learn then you don't have to keep defending it anymore, everybody starts to own it. They go to meetings and they say to the regional council. "But you're telling me farmers will be profitable, but the volume's going to be halved, what about me?" The regional councils have to answer it, and that's what all this is really about was giving - empowering people to ask the right questions.'*

### ***Information flows through farmer networks***

Information about the POP flowed through the farmer networks in two main ways: from a source to a farmer (e.g. from Horizons to a farmer), and/or shared between farmers (*'spread the word'*). Stu likened the information flow between farmers as *'Chinese whispers'* and used this metaphor to describe how the meaning of the message can change as it is passed along the chain:

*'Not everyone will go to all the Fonterra meetings or the Horizon meetings or the Dairy NZ meetings but some do and the rest spread the word. So everyone's getting the information, it just comes in a bit Chinese whispered sometimes.'*

The farmers in this research were upset and angry after the POP was notified. These heightened emotions altered the accuracy of information flowing from farmer to farmer, and as Stu comments: *'getting their back up about imaginary things'*. Stu explains this further:

*'Someone's whispered this at a discussion group and then everyone thinks the worst. We all talk, one person hears something and goes and tells someone else and generally speaks about things, possible embellishments.'*

As a result, the farmers speculated about how the POP would impact on their farm businesses. Owen remembers how he felt: *'I think I got caught up in the hype that was going around that said we cannot farm, we're going to be broke, we're going to be everything else'*. Sam works for Horizons, and believes they did not effectively communicate the practical implications of the POP to farmers. Sam admitted they did not hold enough farmer workshops, and conceded the information provided to farmers was *'too high level'*. As a result, farmers misinterpreted the information, because the message lacked specificity. Sam believes Horizons' ineffective communication increased farmer resistance to the POP:

*'So there was a whole lot of rumours and scaremongering within the farming community that everyone was going to have to destock and this was going to happen and that was going to happen. The perception of what the rules were going to mean for them was just way off and extreme. But because there was no communication coming from the council around what's actually going to happen, they were free to have those thoughts and discussions within the communities'*.

### ***Farming under the One Plan: learning about farm practice change***

The One Plan became operative in December 2014. Farmers are learning from other farmers and staff from organisations about how to obtain a Land Use Consent, and about the expected and accepted farm practices to reduce nitrogen leaching. Fonterra, DairyNZ and Horizons' staff run farmer meetings. Steve is due to get a consent, and went to one of the farmer information meeting because *'I felt like I should go to one, to be a bit responsible, to find out what I should be doing'*. Steve learnt about the farm practices that can reduce nitrogen leaching from staff, from the questions farmers asked, and from other farmer's experiences:

*'They talked about just the different ways that you can maybe negate nitrogen leaching. Like for example the way you shape your paddocks around drains, so that there's not a lot of run-off towards the drain of urea, or nitrogen just flowing into the drain.'*

Ken doesn't require a consent, hasn't been to a One Plan meeting and doesn't go to discussion groups. Ken's son, also a dairy farmer, goes to focus farms, farmer meetings and discussion groups, and Ken relies on his son for advice about farming under the One Plan. Ken reveals:

*'I'll ask him [son], and he's quite blunt and up front, and he'll just say you don't need to do that. He's up with the modern stuff, more than we are.'*

Max is due to get a consent. He prefers to talk to other farmers who have a consent about the process, rather than obtain advice and information from Horizons:

*'I'd talk to the fellas that are going through it now, and that's where I'd get a lot of the advice from, or just how are you going with it. Then I would then talk and use that as a comparison to whichever - I wouldn't talk to Horizons. They're there to tell me the legal black and white, I wouldn't use them for advice'*

## **Discussion**

Social interactions through farmer networks enabled social learning to occur. Farmers shared their experiences and knowledge about the One Plan, expected and accepted farm practices around farming and water quality, and the character and trustworthiness of individuals and organisations. Farmers learnt from those they trust and respect (other farmers, family, trusted advisors, specific staff from organisations) at informal occasions (e.g. at the pub, talking to a neighbour) and at organised events (e.g. at field days, at meetings, talking after a meeting). Social learning in this research is consistent with Blackstock et al. (2010), and was a continual and collective process of knowledge exchange between trusted individuals rather than a process of knowledge transfer from one individual to another. Learning from trusted respected individuals gave farmers the understanding, knowledge and confidence to question current practice, adopt new practice, and to criticise examples of 'poor' farm practice. Consistent with Reed et al. (2010), social learning in this research occurred through social interactions and between individuals in social networks; contributed to a change in individual farmer understanding and behaviour; and contributed to a broader collective change in what is accepted and expected farmer behaviour around farming and water quality.

Social learning through these types of social interactions contributed to a change in farmer awareness and recall of information, and a change in farmers' deep understanding about farm practices and water quality. As a result, farmers understood how certain farm practices contributed to the loss of nitrogen from their farm systems to waterways, and that nitrogen loss impacts negatively on water quality. In addition, individual farmer understanding about nitrogen loss contributed to a change in collective farmer understanding and agreement about what is considered accepted nitrogen loss. Through conversation and observation, farmers assigned 'value' to nitrogen loss (high or low, 'good' or 'bad'), and used nitrogen loss to compare individual farms and farm practices. Collective agreement on what constitutes acceptable nitrogen loss, contributed to farmers' questioning, criticising and at times challenging examples of 'poor' farm practice. As a result of the new knowledge about farm practices and their impact on water quality, local practice norms changed. Practice norms are a type of social norm (Minato, Curtis, and Allan 2010), and were the accepted and expected farm management practices around farming and water quality in this research. Farmer networks enforced these new practice norms, and enabled farmers to informally sanction other farmers who were not using the expected practices ('poor' farm practice). Informal sanctions in this research included criticism and gossip. (Horne 2001) argued that informal sanctions are the main means by which social norms are enforced.

Similar changes in farmer awareness, understanding and behaviour were highlighted by Cotching, Sherriff, and Kilpatrick (2009) and Mills et al. (2011). Social interaction between farmers in both studies contributed to the sharing of knowledge, a change in an individual's deep understanding, and changes in individual and collective behaviour. In addition, the farmers in Mills et al.'s (2011) study learnt about the character and trustworthiness of others, which resulted in social interactions based on trust and respect. Both studies reported increased farmer confidence to question and at times criticise current farm practice, and in



Cotching et al.'s (2009) study, confidence to question information from 'outside experts'. A collective understanding and questioning of current practice, contributed to new practices being adopted.

Trust was pivotal for effective farmer social learning in this research. Trust determined which social networks farmers used for information and knowledge and which networks played a role in changing farmers' practice norms. The farmers in this research were more likely to approach other farmers, trusted advisors, and trusted staff from Fonterra and DairyNZ for advice, information and knowledge about the One Plan, rather than the organisation (Horizons) that introduced, monitors, and enforces this plan. Fisher (2013) found farmers were more likely to use and believe information and knowledge from their trusted veterinarians and other farmers about control of bovine tuberculosis, rather than information from Defra (government): the institution responsible for controlling this disease in the United Kingdom.

Trust between farmers and Horizons was reduced by Horizons' approach towards farmers when the POP was notified; an approach farmers felt was autocratic and authoritarian. This approach suggested to farmers that Horizons had little concern for the wellbeing of local dairy farmers. Farmers felt there was little consultation about the plan, a lack of respect shown towards farmers, and a disregard for farmers' autonomy ('telling farmers what to do on their farms'). As a consequence, farmers were surprised and angered by this unexpected change and this led to resistance to the POP from the farming community. As a result of reduced trust in Horizons, farmers disbelieved, distrusted and challenged information from Horizons. Fisher (2013) and Hall and Pretty (2008) also reported low levels of trust between farmers and government in their respective studies. As a result, farmers described disrespect for government policies (Hall and Pretty 2008), doubt in the information provided, and a reluctance to seek advice from government staff (Fisher 2013).

There was evidence that the social interactions between farmers at times modified, distorted and embellished certain information flowing through farmer networks. As a result, the message became increasingly inaccurate, sensationalised and emotive, focused on the potential negative impacts on individuals, and contributed to resistance to the POP. Emotive and sensationalised media reports about the POP also contributed to farmer resistance. This finding suggests a feedback loop, whereby 'distorted truth' embellishes fact, which contributes to an extreme view of change, which in turn exacerbates emotional resistance. Figure One illustrates this feedback loop. Although strong relationships between individuals create positive outcomes (e.g. emotional support, access to information and knowledge, encouragement to change practice), the negative phenomenon that creates 'distorted truth' or disinformation, has not been widely reported in the literature.

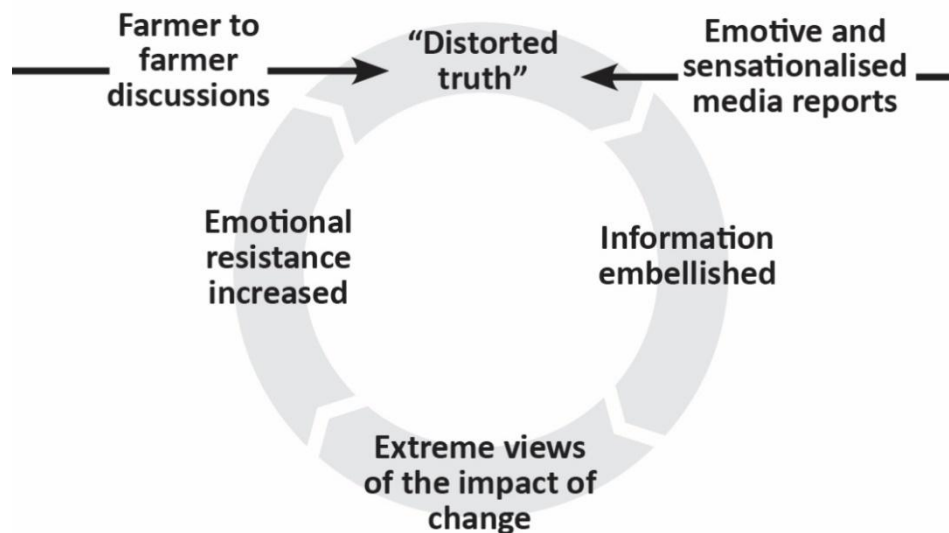


Figure One: The effect of ‘distorted truth’ on information flows through farmer networks.

### Conclusion

The aim of this paper was to draw on relevant literature and a case study of dairy farmers’ responses to water quality interventions, to explore how social interactions between farmers contributed to social learning about farming and water quality. This research emphasises that social learning contributes to a collective farmer understanding about accepted farm management practices, and that this collective understanding about what is expected practice is pivotal for farmer behaviour change. Farmer to farmer interactions were the key for these dairy farmers to understand, manage and adapt to enforced change.

The farmers in this research accepted practice change was required, but resisted the approach used by Horizons to signal farm practice change was expected. Farmer behaviour change relies on information and knowledge from individuals and organisations who are believed to be both competent and working with rather than seemingly against farmers (i.e. show they care). The lack of trust and respect between farmers and Horizons hampered Horizons’ ability to provide effective information, advice and support to farmers. Relationships based on distrust, disbelief and disrespect will not provide farmers with the information and advice they seek, and will not encourage and support long-term farmer practice change.

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