

Research findings brief

Title: The role of information in land-use decision making: the perspective of farmers in New Zealand

Who is this research brief for?

- Rural professionals
- Policy makers
- Farmers and growers

Research timeline: December 2022 – May 2023

Research aspects: Literature review, Semi-structured interviews, and a Focus group

Key points:

Information is important to support effective strategic land-use decision-making, particularly in response to changing markets, policy and climate. This research plays a part in understanding how farmers interact with information in the digital age, which is important to inform effective approaches to information provision.

A literature review and qualitative research methods were conducted to investigate the perspectives of New Zealand farmers. This included twenty-two semi-structured interviews and a focus group.

Farmer information-gathering and knowledge-sharing habits follow different patterns in the digital age. Farmers utilise a range of information sources and there have been shifts toward evolving channels that are digital and interpersonal. This has brought challenges associated with information overload and misinformation. To communicate effectively, Agricultural Knowledge and Innovation Systems (AKIS) need to adapt and value local knowledge.

The results indicate that the role of information in land-use decision-making is personal, contextual, and unique for each farm system. Farmers feel that information to support strategic land-use decision-making is challenging to source and lacking in availability, especially concerning regional contexts.

How can this research be used?

This research contributes to understanding how and why farmers interact with information and whom they trust, which could be of great value for agricultural stakeholders and policymakers to:

- Inform the design of effective information systems and approaches to extension
- Identify avenues to connect and communicate effectively
- Improve the dissemination of information and knowledge exchanges
- Encourage awareness and uptake of sustainable land-use practices
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Why is this research needed?

A mix of social, environmental, and regulatory pressures are prompting discussions on land-use change in Aotearoa.^{1,2} As a result, farmers are being tasked with the complex challenge of transitioning toward higher value, pro-environmental land-use systems whilst adapting to a changing climate.

Farmer decision-making and land-use change are complex, driven by a wide range of interrelated factors including information.³ Information systems have changed radically over recent decades. This period is known as the information age, a time characterised by instantaneous information exchanges in a global and unregulated context, driven by evolving technological innovations.⁴

Farmer knowledge-building and information-sharing habits follow different patterns in the information age.⁵ This time has brought extraordinary opportunities for communication and learning, along with new challenges associated with misinformation and information overload.⁶ Ultimately, it is the land-manager who implements and makes land-use decisions that require information. Hence, understanding the needs and perspectives of farmers is important to inform the design of effective information systems and extension approaches.

What did the research do?

This research explored the role of information in land-use decision-making from the perspective of farmers in New Zealand. This research was informed by behavioural frameworks in the agricultural literature that recognise the importance of information in farmer decision-making.⁷ Following a literature review, twenty-two semi-structured interviews with farmers were conducted between December 2022 and May 2023. This included 10 online, 12 in-person, and 5 with farming couples (i.e., husband and wife), totalling 27 individuals. Participants were required to be commercial, pastoral-based farmers located in New Zealand. Each interview followed the same interview schedule and lasted anywhere between 45 minutes - 3 hours. In addition to the semi-structured interviews, a focus group with young farmers was conducted to provide further perspectives on the topic. A participatory mapping process was utilised in the focus group to gain synergistic responses. The participants in the focus group included 10 current and aspiring farmers from the Lincoln and

¹ Ministry for the Environment & Statistics NZ. (2021). Our land 2021. <https://environment.govt.nz/publications/our-land-2021/>

² Bayne, K., & Renwick, A. (2021). Beyond sustainable intensification: transitioning primary sectors through reconfiguring land-use. *Sustainability*, 13(6), 3325. <https://doi.org/10.3390/su13063225>

³ Journeaux, P., Reenen, E. v., Manjala, T., Pike, S., Hanmore, I., & Millar, S. (2017). Analysis of drivers and barriers to land use change: a report prepared for the ministry for primary industries. Agfirst. <https://www.mpi.govt.nz/dmsdocument/23056/direct>

⁴ Castells, M. (2009). *The rise of the network society* (2nd ed.). Wiley-Blackwell. <https://doi.org/10.1002/9781444319514>

⁵ Nicholas Kirk, Ronlyn Duncan, Pamela Booth, & Melissa Robson-Williams. (2022). Shifting knowledge practices for sustainable land use: insights from producers of aotearoa new zealand. *Frontiers in Agronomy*, 4. <https://doi.org/10.3389/fagro.2022.991853>

⁶ Bawden, D., & Robinson, L. (2020). Information overload: an overview. In *Oxford encyclopedia of political decision making*. Oxford University Press. <https://doi.org/10.1093/acrefore/9780190228637.013.1360>

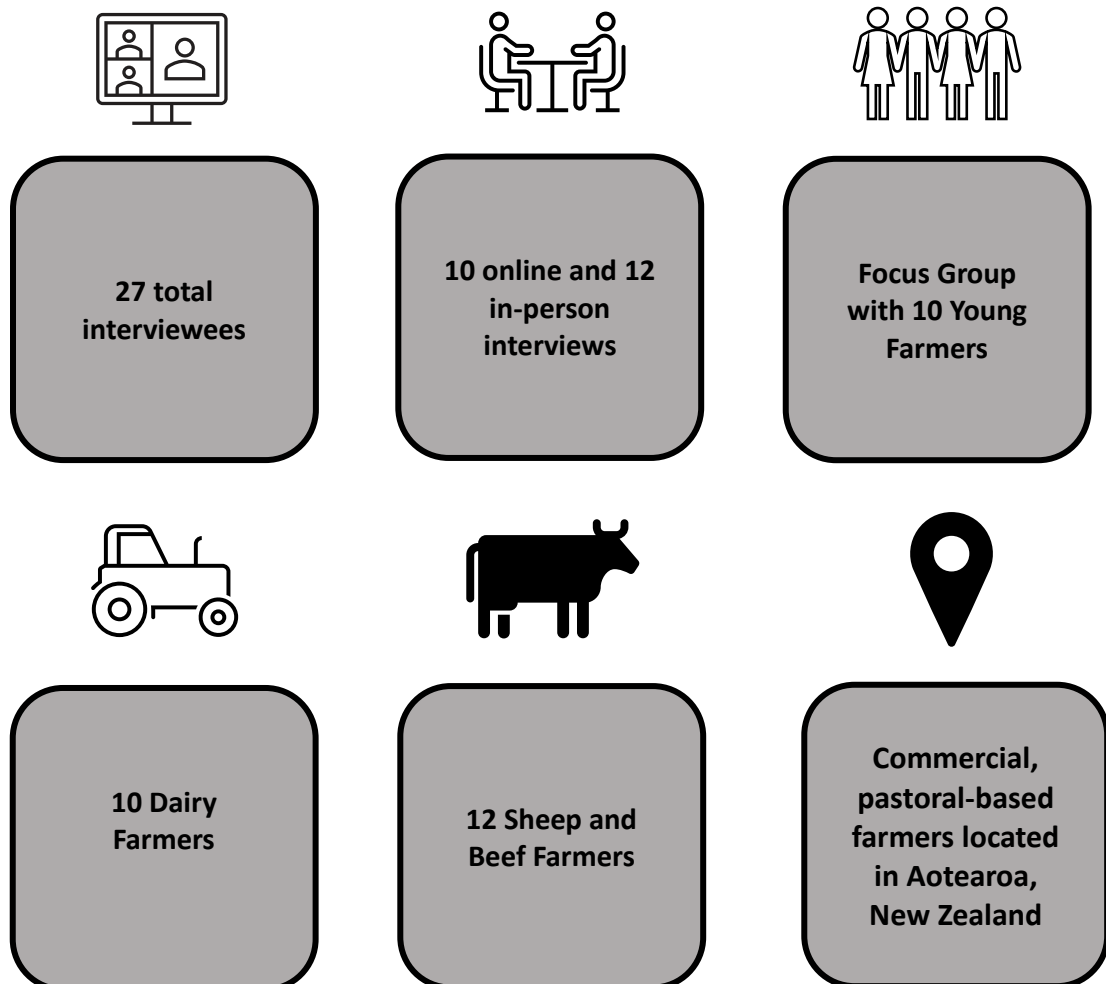
⁷ Liu, T., Bruins, R. J. F., & Heberling, M. T. (2018). Factors influencing farmers' adoption of best management practices: a review and synthesis. *Sustainability*, 10(2), 432. <https://doi.org/10.3390/su10020432>

Banks peninsula young farming groups. All qualitative data was transcribed and analysed inductively through thematic analysis in NVIVO software. These research methods were reviewed and approved by the Lincoln University Human Ethics Committee and conducted in accordance with the University guidelines.

This research centred around three central areas of enquiry:

1. What sources and forms of information do farmers use and trust?
2. How do farmers validate and interact with information when making decisions?
3. Do farmers in NZ feel they can find the information they need when making strategic land-use decisions?

Overview of research methods:



What was found?

The results evidence that information is important for decision-making and that gathering processes are personal and contextual.

“Information is crucial... if you don't have the right information you're just gonna fall over.”

(Dairy farmer 2)

The farmer participants amalgamated information from a variety of formal and informal sources across digital and physical formats. Farmers also recognised an increasing amount of information and data that is being collected within farm systems.

The findings suggest that the structure and characteristics of farm systems are important to consider when designing extension approaches as they influence how land managers interact with information. Examples of these elements include sector, location, digital connectivity, size, and governance structure.

i. Sources of information:

Farmers identified that they utilise traditional information sources and institutions (i.e., industry groups, advisors, banks, local government) however, digital and informal sources (i.e., the internet, social media, podcasts, and interpersonal networks) were often preferred and most commonly used. The farmer participants also engaged as researchers and information curators online and across networks to share learnings in communities of practice.

Farmer networks were effective in facilitating group learning and innovation processes, which were strong motivators for ongoing engagement. Importantly, intergenerational knowledge and information about consumers were greatly valued by farmers.

Although industry groups were identified as helpful for sourcing information related to production-oriented matters (i.e., behind the farm gate), the relevance for strategic land-use decision-making was mixed due to sector silos and fragmentation of information and expertise.

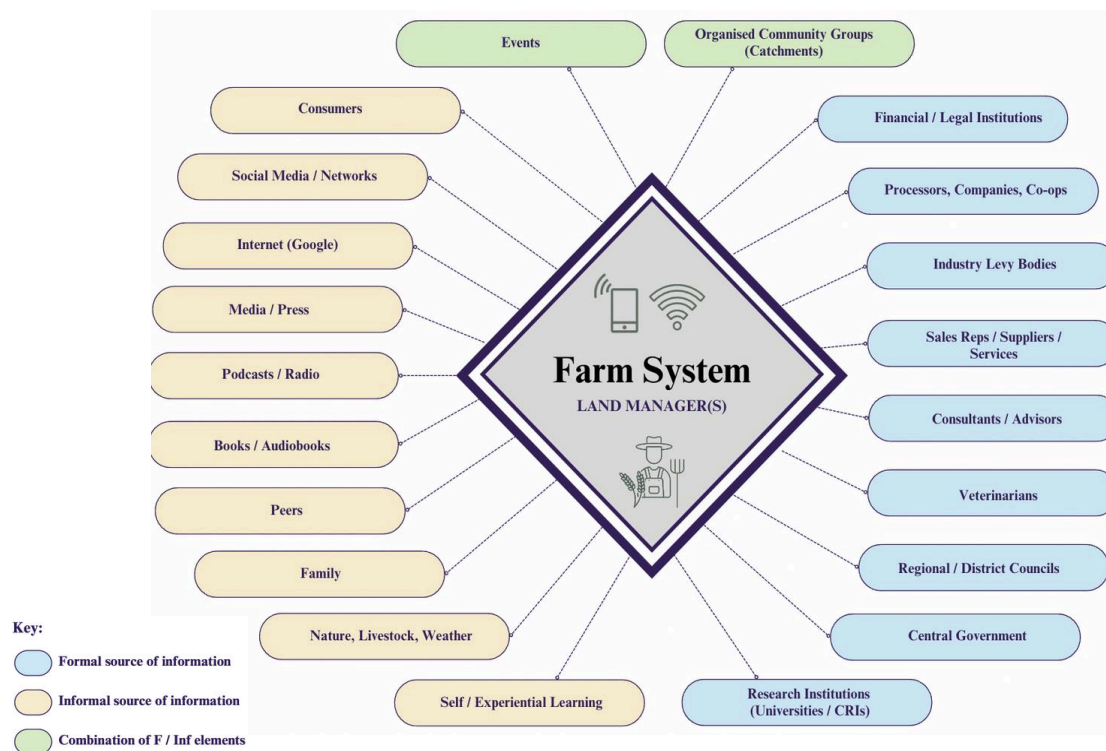
The need to link digital and physical and combine the best of formal and informal information was seen as important. One way this is being achieved is through organised community catchment groups. Interviewees greatly valued how catchment groups are community-led, diverse in membership, region-specific, and outcomes-focused. Knowledge brokering through intermediaries at the catchment level was considered an effective way to disseminate information and connect stakeholders with different cultures of knowledge (i.e., scientists and farmers).

“It's the catchment's role to decipher what is going on... you want more work done at the catchment community level because they are your interface or your knowledge broker. If your knowledge brokering happens at a catchment level or a community level it's more likely to be adopted.”

(Sheep & beef farmer 7)

The sources of information identified by farmers are depicted in Figure 1.

Figure 1.
Farmer Sources of Information



Note. This framework was compiled through the results that arose throughout interviews and informed by the literature on agricultural information, advisory, and knowledge systems.^{8,9,10}

ii. Trust and validation

Regardless of the person or institution involved in information provision, trust was personal and evolved over time, built on a foundation of mutual respect. Trust was

relatively low in online sources, sources with commercial interests, and with central and local government. The farmer participants generally concurred that their most valued and trusted sources of information were other high-achieving farmers and

⁸ Nicholas Kirk, Ronlyn Duncan, Pamela Booth, & Melissa Robson-Williams. (2022). Shifting knowledge practices for sustainable land use: insights from producers of aotearoa new zealand. *Frontiers in Agronomy*, 4. <https://doi.org/10.3389/fagro.2022.991853> =

⁹ Ministry for Primary Industries. (2019). *Climate issues facing farmers: sustainable land management and climate change research programme*. <https://www.mpi.govt.nz/dmsdocument/33747-climate-issues-facing-farmers-sustainable-land-management-and-climate-change-research-programme>

¹⁰ Liu, T., Bruins, R. J. F., & Heberling, M. T. (2018). Factors influencing farmers' adoption of best management practices: a review and synthesis. *Sustainability*, 10(2), 432. <https://doi.org/10.3390/su10020432>

interpersonal networks. However, the view of what achievement represented differed for each farmer, and there were mixed experiences with peers and peer groups in different regions.

“Trust probably comes more from people on the ground, people who have similar values, similarly minded people that are close to the land.”

(Dairy farmer 5)

Gathering credible and trustworthy information was identified as challenging in the digital age and farmers were often concerned about misinformation and often experienced information overload.

“Information is so easily accessible nowadays so you can go and find research that supports your theory, or your idea, and then you can go find something that conflicts it or counteracts it and they're all peer-reviewed... it's almost like information overload. There is so much out there that how do you find the right information for your structure, business, or decision?”

(Sheep & beef farmer 11)

To validate information, a triangulation and cross-referencing process was utilised. Generally, triangulation started internally (i.e., personal cognitive processing, research online, and discussion with family members) and was followed by external validation (i.e.,

with peer networks, consultants, and industry groups).

“I suppose the first step would be the internet, but then very closely behind it, it's real people and real communication to take the next step.”

(Sheep & beef farmer 8)

iii. Strategic information

Despite an abundance of information available, interviewees felt that information to support strategic land-use decision-making was both challenging to source and lacking in availability, especially concerning regional contexts. Farmers described a disconnect between science and implementation, how there is fragmented/specialised expertise, and noted operating in silos, all of which contributed to challenges.

“I think it is really challenging because for the vast majority of the time farmers will get information specific from industry sources... you know some of the information we get is great but it's also like a closed loop that stops us from looking at what are other potential uses for that land.”

(Sheep & beef farmer 3)

Additionally, farmers often described operating in a production-oriented mindset rather than thinking strategically or long-term which impacted information-gathering habits.

Most dairy farmers are only worried about year to year there's not really a lot of future foresight, that's our blind spot.”
(Dairy farmer 6)

Insights from Young Farmers:

The young farmer participants greatly valued informal and digital information channels including social media, influencers, and podcasts. As digital natives, these channels were used by young farmers to share and amplify knowledge and gather information about formal institutions (i.e., the government, industry groups etc.) indirectly.

An interesting insight that arose from the focus group was the utilisation of Artificial intelligence (AI), alongside strong desires to embrace new digital technologies. These results illustrate the potential differing digital baselines of younger and older generations, which suggests that different approaches to information provision may be more effective.

Key Takeaways

Farmer information-gathering habits have evolved thanks to digital innovations and will continue to change at pace. Farmers require digital literacy and would benefit from knowing where to source and/or whom to gather strategic land-use information from. Furthermore, the result signal the need for better coordination between informal and formal sources, for example, through intermediaries who can facilitate the flow of information.

Based on the perceptions and insights that were raised in the research the recommended actions emerged:

Possible actions:

Farmers could usefully:	Industry groups/ rural professionals could:	Regulatory bodies could:
Upskill in digital literacy (i.e., critical thinking skills) and reflect on information-gathering habits to assist with information overload.	Develop a digitisation strategy - including a transparent, responsible approach to information provision and data ownership.	Adopt open, transparent communication approaches and collaborate with industry to improve digital literacy. Develop digitisation and data strategies / policies including

<p>Engage in integrated farm planning, which can be useful to assist with driving long-term strategic thinking to inform land-use decisions. Reflecting on the direction of the farm business, why it exists, and what it seeks to achieve are helpful prompts. This can assist in identifying risks and knowledge gaps to then inform more purposive information gathering and action.</p> <p>Consider joining a catchment group or similar network to grow connections and assist in learning processes.</p>	<p>Train stakeholders in soft skills and adopt listening rather than telling approaches.</p> <p>Take stock of existing farmer groups / networks and collaborate to facilitate flows of information.</p> <p>Build organisational competencies to align with digital literacy and changing information needs/gathering habits of farmers.</p> <p>Seek feedback around the areas of information required and involve farmers in co-designing hybrid communication approaches.</p>	<p>transparent communication approaches and AI</p> <p>Train intermediaries to effectively facilitate information flows between stakeholders and consider hybrid approaches (i.e., digital and physical) to communication. In line with industry groups, this could include training agents in soft skills, establishing feedback loops, and adopting relational approaches to consultation.</p> <p>Support research institutions and industry groups to promote and provide open-access strategic land-use decision-making tools and data. For example, this could include ongoing support for resources such as the data supermarket produced as a part of the Land-use opportunities: Whitiwhiti ora research programme.¹¹</p> <p>Facilitate and provide ongoing support for organised community groups. For example, this could include catchment groups.¹²</p>
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Future Research recommendations:

Some important areas that could be considered to help further scientific and theoretical knowledge include:

- Research on the implications of misinformation, confirmation bias, and information disorders (i.e., information overload) in New Zealand’s agri-food sector.
- Investigation into influential and evolving sources of information (i.e., catchment groups, audio formats, social media, and AI).

¹¹ Our Land and Water. (2023). Whitiwhiti ora enabling decisions on land use opportunities for aotearoa. <https://landuseopportunities.nz/>

¹² Sinner, J., Robb, C., Kilvington, M., Tane, P., Tadaki, M., & Challies, E. (2023). *Where next for catchment groups? Lifting ambition and gearing up for the long game*. Cawthron Institute. https://www.researchgate.net/publication/369366580_Where_next_for_catchment_groups_Lifting_ambition_and_gearing_up_for_the_long_game

- Investigation into digital literacy (i.e., competencies and baselines) to inform the design of information systems, policy and planning.
- Research into understanding the attributes of effective intermediaries and farmer influencers to assist with information provision (i.e., employ social network analysis and explore nuances across the platforms).
- Investigation of the perspectives, methods, and techniques adopted by stakeholders who provide information (i.e., industry groups and government) which would produce useful insights into the quality and content of the information circulating in NZ's Agricultural Innovation system. (AIS)
- Understand differences in information-gathering and the impacts of digitisation across different cultural knowledge systems (i.e., Māori and non-Māori land managers) as differing mindsets, values, and cultures of knowledge cannot be separated from information-gathering and decision-making processes.