



Manaaki Whenua
Landcare Research



Regenerative principles applied in New Zealand

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'Think piece' on Regenerative Agriculture in Aotearoa New Zealand: project overview and statement of purpose

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Find the full project overview, white paper and topic reports at ourlandandwater.nz/regenag and www.landcareresearch.co.nz/publications/regenag

This report is one of a series of topic reports written as part of a 'think piece' project on Regenerative Agriculture (RA) in Aotearoa New Zealand (NZ). This think piece aims to provide a framework that can be used to develop a scientific evidence base and research questions specific to RA. It is the result of a large collaborative effort across the New Zealand agri-food system over the course of 6 months in 2020 that included representatives of the research community, farming industry bodies, farmers and RA practitioners, consultants, governmental organisations, and the social/environmental entrepreneurial sector.

The think piece outputs included this series of topic reports and a white paper providing a high-level summary of the context and main outcomes from each topic report. All topic reports have been peer-reviewed by at least one named topic expert and the relevant research portfolio leader within MWLR.

Foreword from the project leads

Regenerative Agriculture (RA) is emerging as a grassroot-led movement that extends far beyond the farmgate. Underpinning the movement is a vision of agriculture that regenerates the natural world while producing 'nutrient-dense' food and providing farmers with good livelihoods. There are a growing number of farmers, NGOs, governmental institutions, and big corporations backing RA as a solution to many of the systemic challenges faced by humanity, including climate change, food system disfunction, biodiversity loss and human health (to name a few). It has now become a movement. Momentum is building at all levels of the food supply and value chain. Now is an exciting time for scientists and practitioners to work together towards a better understanding of RA, and what benefits may or not arise from the adoption of RA in NZ.

RA's definitions are fluid and numerous – and vary depending on places and cultures. The lack of a crystal-clear definition makes it a challenging study subject. RA is not a 'thing' that can be put in a clearly defined experimental box nor be dissected methodically. In a way, RA calls for a more prominent acknowledgement of the diversity and creativity that is characteristic of farming – a call for reclaiming farming not only as a skilled profession but

also as an art, constantly evolving and adapting, based on a multitude of theoretical and practical expertise.

RA research can similarly enact itself as a braided river of interlinked disciplines and knowledge types, spanning all aspects of health (planet, people, and economy) – where curiosity and open-mindedness prevail. The intent for this think piece was to explore and demonstrate what this braided river could look like in the context of a short-term (6 month) research project. It is with this intent that Sam Lang and Gwen Grelet have initially approached the many collaborators that contributed to this series of topic reports – for all bring their unique knowledge, expertise, values and worldviews or perspectives on the topic of RA.

How was the work stream of this think piece organised?

The project's structure was jointly designed by a project steering committee comprised of the two project leads (Dr Gwen Grelet¹ and Sam Lang²); a representative of the New Zealand Ministry for Primary Industries (Sustainable Food and Fibre Futures lead Jeremy Pos); OLW's Director (Dr Ken Taylor and then Dr Jenny Webster-Brown), chief scientist (Professor Rich McDowell), and Kaihāpai Māori (Naomi Aporo); NEXT's environmental director (Jan Hania); and MWLR's General Manager Science and knowledge translation (Graham Sevicke-Jones). OLW's science theme leader for the programme 'Incentives for change' (Dr Bill Kaye-Blake) oversaw the project from start to completion.

The work stream was modular and essentially inspired by theories underpinning agent-based modelling (Gilbert 2008) that have been developed to study coupled human and nature systems, by which the actions and interactions of multiple actors within a complex system are implicitly recognised as being autonomous, and characterised by unique traits (e.g. methodological approaches, world views, values, goals, etc.) while interacting with each other through prescribed rules (An 2012).

Multiple working groups were formed, each deliberately including a single type of actor (e.g. researchers and technical experts only or regenerative practitioners only) or as wide a variety of actors as possible (e.g. representatives of multiple professions within an agricultural sector). The groups were tasked with making specific contributions to the think piece. While the tasks performed by each group were prescribed by the project lead researchers, each group had a high level of autonomy in the manner it chose to assemble, operate, and deliver its contribution to the think piece. Typically, the groups deployed methods such as literature and website reviews, online focus groups, online workshops, thematic analyses, and iterative feedback between groups as time permitted (given the short duration of the project).

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Regenerative principles applied in New Zealand

Contract Report: LC3954-2

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1 Introduction

Much of the narrative on Regenerative Agriculture (RA) refers to principles rather than practices. Globally there are many different versions of RA principles, developed by organisations or by individuals. Many of these appear to target fundamental ecological and/or human principles to be relevant anywhere in the world (e.g. Anon 2020), while others may be tailored to a specific region, sector or value chain (e.g. Danone 2021). There have been questions raised about whether RA principles are relevant (or anything new) in Aotearoa New Zealand, where our soil organic matter levels are comparatively high and rotational grazing systems very common. To answer this question, we sought to identify what principles guide the practices and decision making of New Zealand farmers and growers that are explicitly adopting what they consider to be an RA approach on their farms. We also asked these farmers and growers what attributes they considered to be part of a regenerative mindset.

This report summarises and describes 11 principles drawn from multiple focus groups with NZ farmers and growers. Some principles are focused on encouraging farm practices that directly improve biological/ecological function (see 'Instructional' in Fig. 1). Others relate more to the perspectives and decision-making processes that participants identified as important for supporting farm practice implementation (see Mindset & Attitude in Fig. 1).

There were no clear distinctions between participants' responses to what they considered a regenerative mindset and to what principles guide practices and decision making. This lack of distinction suggests that for farmers and growers, a regenerative mindset simply describes a person who embodies the regenerative principles. The concept of a regenerative mindset is perhaps best reflected in the many quotes featured in this report.

The principles described in this report should not be considered definitive but hopefully provide guidance for farmers and growers interested in RA systems and practices.

2 Data collection and analysis

Focus groups were used to generate and collect data to inform the development of principles of RA. Focus groups are a qualitative data collection method commonly used to discover the attitudes and perceptions of participants (Kruger et al. 2019).

Focus groups can also help researchers understand how group dynamics affect individual attitudes, as well as individual decision-making processes (Stewart & Shamdasani 2014). In this research we have complemented the use of focus groups with questionnaire surveys (Ward et al. 1991). There are many examples of these two methodologies working in a complementary fashion, such as in studies of social marketing (Folch-Lyon & Trost 1981) and health research (Ashton et al. 2017), as well as in the adoption of precision farming techniques (Pedersen et al. 2004).

The focus groups were conducted online using the Zoom video conferencing software (Archibald et al. 2019) between June and August 2020. The decision to conduct focus groups

online rather than in person was influenced by the ongoing COVID-19 pandemic, which required NZ to enter a national quarantine lockdown between March and May of 2020, and again between August and September 2020 in the Auckland region. With ongoing restrictions on travel, the decision was made to conduct focus groups online.

However, beyond the constraints posed by the pandemic, there are benefits to hosting online focus groups. One benefit is that it does not require participants to travel to and from a specific location to attend the focus groups (Farnsworth & Boon 2010; Deakin & Wakefield 2014). This permitted the focus group organisers to connect people from different parts of the country at the same time (Rupert et al. 2017). Participants could also attend the focus groups from their home or office, reducing the time they had to devote to the project.

There are also specific advantages to using the Zoom video conferencing software over similar technologies. One advantage is the ability to record and store focus group recordings without the need to use third-party software, something that is particularly important if you are collecting data on sensitive topics (Archibald et al. 2019). The real-time encryption of meetings, and the ability to back up recordings to the Cloud, are other advantages to the use of video platforms like Zoom (Archibald et al. 2019).

However, drawbacks to hosting online focus groups also ought to be mentioned. First, researchers and focus group moderators are still learning how to use the software and how to perform in front of the camera to achieve the best data collection (Adams-Hutcheson & Longhurst 2017). This is critical, because some research has shown that data collected during online focus groups are less rich compared with data collected from in-person focus groups (Schneider et al. 2002; Brüggem & Willems 2009). Participant responses in online focus groups tend to be shorter and more immediate, with less explanation and fewer details (Abrams et al. 2015; Woodyatt et al. 2016). This observation is not universal: other researchers suggest online focus groups generate data comparable to in-person focus groups (Kite & Phongsavan 2017; Flynn et al. 2018).

Given the potential issues with quality of data, Forrestal et al. (2015) have proposed best practice guidelines for conducting online focus groups. These guidelines were followed as much as possible in the design and execution of the focus groups for this project. The guidelines are as follows.

In preparing the focus group:

- keep groups smaller than in-person focus groups (face-to-face 8–10 participants, online 5–8 participants)
- over-recruit by two or three participants, as some people will choose not to attend at the last moment
- schedule the focus groups with participants' needs in mind (e.g. schedule around milking times and calving for dairy farmers)
- get the participants to test the equipment and software
- communicate detailed instructions, and send regular reminders to participants.

In administering the focus group:

- monitor consent and participation using the platform's attendees list
- use a round-robin format and wrap-ups to manage the discussion.

After completing the focus group:

- send incentives promptly after the discussion
- download the recording to a secure server immediately after conducting the interviews.

Participants from four sectors (Dairy, Sheep and Beef, Arable, and Viticulture) were invited to join three focus groups: pastoral (Dairy, Sheep and Beef), Arable and Viticulture. Initial participants were identified by the lead researcher who then used a snowball technique (Naderifar et al. 2017) to identify other participants. Participant distribution across each sector was as follows: 4 Dairy, 4 Sheep and Beef, 7 Arable, and 5 Viticulture, although some of the participants manage multiple enterprises. Participants were selected based on their reputations as being leading and experienced RA practitioners. Most participants were primarily farmers or growers, however a few advisor/educators also participated.

The focus groups were conducted over Zoom video conferencing software (Archibald et al. 2019) in October 2020. Best practice guidelines for conducting online focus groups were followed as much as possible in the design and execution of the focus groups. Each focus group was recorded and there was a note taker. After the focus groups, the lead researcher and the note taker relistened to the recording and identified relevant and key material that was then transcribed.

Two key questions guided the focus groups discussion in turn: 1) What are the principles that guide your practices and decision-making? and 2) What does a regenerative mindset mean to you? For the pastoral focus group this was run over two 60–90 minutes sessions, and for the arable and viticulture groups it was run in one (approx. 90 minute) session as two halves. For the first question, where necessary to elicit discussion to cover all the aspects of people's practice, the topics covered by Understanding Ag's six principles of soil health³ were used as prompts.

The researcher used a mixed inductive and deductive thematic analysis approach (Braun & Clarke 2006; Fereday & Muir-Cochrane 2006) to analyse the data from the first question "What are the principles that guide your practices and decision-making?". Initially, the researcher looked at data from each sector to identify sector specific themes. The researcher grouped together common insights and explored each theme by building a code book in the form of a code tree for each focus group, which was circulated to focus group participants for feedback and comment. While this process was designed to identify both similarities and differences, at this point it became clear that there was little difference between the sectors, and the focus shifted to multi-sector rather than sector-specific

³ <https://understandingag.com/resources/fact-sheets/>

principles, integrating these code trees and generating an initial set of multi-sector principles.

The researcher used an inductive approach to analyse the data from the second question “What does a regenerative mindset mean to you?”. Initially the researcher examined the data from all sectors to identify common themes. It became clear that all the key themes that were identified in response to the second question had all already been raised in response to the first question. The two questions were initially chosen by the researcher because the concepts of regenerative principles and a regenerative mindset are often considered distinguishable concepts. The fact that participants tended to lump them together suggests that, at least in the minds of farmers and growers, they might be two sides of the same coin. The data from the second question were used to add richness to the relevant themes and principles identified in responses to the first question. Once preliminary principles were identified, these were again circulated to all participants for comment and feedback was incorporated. The draft principles and descriptions were sent to anonymous third-party reviewers, whose helpful questions and comments were addressed, before the final draft was submitted for academic review.

3 Results

Figure 1 and Table 1 below show the 11 regenerative principles that were identified from the analysis of the focus groups. What participants considered to be aspects of a regenerative mindset are captured within the principles on the left-hand side in dark blue. These principles relate more to the mindset, attitudes, and human behaviours that participants considered important for supporting regenerative management. The principles on the right-hand side, primarily in light blue, relate more directly to farm systems and practices. They also have a lot in common with the popular soil health principles developed in the USA⁴. This latter point supports a common narrative in RA circles that, while the biophysical context of farms varies hugely throughout the world, at some level the ecological processes and farm management approaches are very similar and therefore so are the farming principles that support ecological health and function. Some principles will naturally feel more relevant and receive greater emphasis from different farmers and growers, depending on the nature of their farm system.

⁴ <https://understandingag.com/resources/fact-sheets/>.

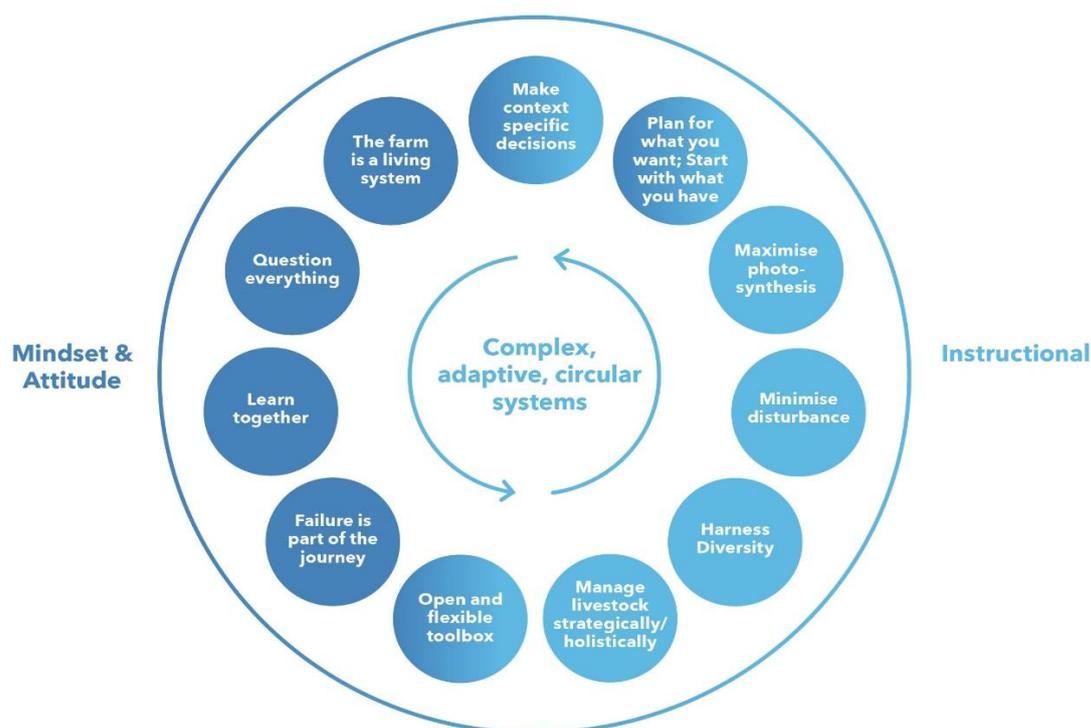


Figure 1. Infographic displaying the 11 principles that emerged from the focus groups. Principles associated more with mindset and attitude are on the left (dark blue), while more instructional (farm practice) principles are on the right (light blue). All principles are underpinned by the concept of farms as complex, adaptive, circular systems.

Table 1. The 11 regenerative principles that emerged from the focus groups, including short explanatory statements for each principle

<i>The farm is a living system</i>	Living systems are complex and constantly evolving – understanding how nature functions supports holistic decision making.
<i>Make context-specific decisions</i>	Context varies from place to place, person to person and season to season – adapt your system and practices to suit.
<i>Question everything</i>	Be curious, question your beliefs and test different ideas.
<i>Learn together</i>	Connect with like-minded peers to speed up the learning journey – include perspectives different from your own.
<i>Failure is part of the journey</i>	Push beyond your comfort zone – small failures provide the best learning opportunities.
<i>Open and flexible toolbox</i>	Try to use practices that help improve ecosystem function, while keeping others up your sleeve for if or when you need them.
<i>Plan for what you want; start with what you have</i>	Transitions take time – clear goals, monitoring and planning are key.
<i>Maximise photosynthesis (year-round)</i>	Treat your farm like a solar panel – bigger green leaf area supports greater photosynthesis. meaning more food for soil microbes and improved soil health.
<i>Minimise disturbance</i>	Keep the soil covered and limit disturbance from chemical application, soluble fertiliser, machinery. and livestock compaction.
<i>Harness diversity</i>	Diversity benefits the whole ecosystem – microbes, insects, plants, birds, livestock. and your community.
<i>Manage livestock strategically/holistically</i>	When managed well and adaptively, livestock are a powerful tool for building biological function and fertility in our soils.

In summary, these principles reflect the emphasis participants placed on treating farms as complex and living ecosystems, which in turn requires farmers to invest time and energy learning about how nature functions. They acknowledge that every farm will have its unique differences, which require farmers to innovate and adapt ideas to each particular context. Farmers are encouraged to enjoy this challenge and view the inevitable failures as valuable learning experiences. The principles emphasise the importance of utilising a broad toolbox of practices (especially when going through a system transition), developing new practices designed to improve health and function while keeping the 'conventional' toolkit handy in case it is needed to save a crop and stay in business. They stress the importance of planning with goals in mind, while being mindful that some system transitions can take time and require a gradual approach. They also stress the importance of learning alongside others in our communities to accelerate the process, minimise risk, and build a support network. The instructional principles guide farmers to reduce, eliminate, modify or adopt practices that individually and collectively improve ecosystem health and resilience.

The concept of an RA continuum (not shown in Fig. 1) recognises that all farmers sit somewhere and may transition at any speed or scale, utilising some, none or all of the principles in Figure 1. Similarly, many mainstream farmers may recognise many of their existing behaviours and practices reflected in these principles. While this could prove insightful, their primary purpose is to help identify opportunities for continuous improvement. The opportunity for transformative change will be when farmers and growers fully embrace the concept of a 'regenerative mindset' and work with all of the principles together.

The tables below describe each principle in greater detail and provide supporting quotes to help readers understand more deeply the perspectives of the farmers and growers that underpinned this work.

4 The farm is a living system

Living systems are complex and constantly evolving – understanding how nature functions supports holistic decision making

Description:	Example quotes:
<p>A general observation arising from the focus groups was that for many, and possibly most, farmers, knowledge of ecological processes, soil biology and microbiomes is quite limited. Yet, knowledge and understanding are considered essential to developing systems and practices that leverage natural processes to help farmers achieve their goals. Introducing farmers to this knowledge and the potential benefits of working more with natural processes, triggers significant changes in management practices based on their evolving understanding of how to reduce harm and increase health and function.</p> <p>As farmers begin to transition their farm systems, they soon realise their farm ecosystems are even more complex than they first thought. This can in some ways be daunting, but generally farmers find the learning journey exciting and empowering.</p> <p>Overall, participants articulated that there were greater risks during transitions for farmers who did not have sufficient understanding of how their farm ecosystems function. For example, certain practice changes may not produce the expected results. To some this may seem to be a failure of the practice; however, there may in fact be other aspects of the system that need addressing in order for the new practice change to work as expected.</p>	<p><i>'Look at the whole farm/property as a living organism that can help you get balance, especially with beneficial insects, etc.'</i> – Viticulture FG</p> <p>'If we are going to encourage something like regen ag, we've got to look at the fact that there is a knowledge gap there. There's a lot of people that don't understand what makes their soil work and what makes their crops grow and exactly how everything functions.' – Arable FG</p> <p>'The more I learn, the harder this whole thing seems. The more knowledge you gain, it just opens your eyes to so much.' – Pastoral FG</p> <p>'There's a whole lot we don't know and I'm finding that the more I know, the more I realise I don't know. And that's what makes it so much fun.' – Arable FG</p> <p>'I'm getting push back from people who say that, if there was a problem with [their] system, [their] yields would go down. But what they don't realise is how much more, in the way of inputs, they are putting on than they were 5 years ago, let alone 10 years ago.</p> <p>There's a disconnect there between knowing how things naturally work and what is the function of soil.' – Arable FG</p> <p>'We've always looked to synthetics as our tools to overcome difficulties, and really we've really just got to understand that biological system a lot better and it's only through people's experience that we get to understand that.' – Arable FG</p>

Description:	Example quotes:
<p>To help overcome these risks, participants emphasised the value of investing in learning from the experiences of other farmers, practitioners, scientists, etc. Learning from others in similar contexts can help farmers avoid making the same mistakes and figure out the nuances of implementing certain changes. On the other hand, learning from others in different contexts can spark different ideas that could be adapted.</p> <p>This principle has strong connections to what participants considered important components of a 'regenerative mindset'. These components included:</p> <ul style="list-style-type: none"> • Promoting life and diversity, not killing and controlling • Observing the whole ecosystem and understanding how nature and living systems work • Seeing nature as a teacher and mimicking ecological patterns (adaptive and evolving) • Embracing diversity in nature, people, worldviews • Growing health, not 'fixing' something 	<p>'On a side note, I did a little field day the other day and I had a thought afterwards that I probably need to have a 5-minute speech about holistic management to start things off. Because that kind of informs everything you do – we're getting down into cover cropping and what species we're planting here and what we're doing there, but if you're not looking at it at a high level across the whole season and growing a profitable crop, it's easy to get distracted into one little part of the whole system. It's how you lead with that holistic management thing, which is, "Let's not reduce all these problems we're having to this problem, this solution; let's look at the whole picture".' – Viticulture FG</p> <p>'We've been really busy seeing nature as the problem, rather than seeing nature as the teacher or that nature has the solution. If you just look at a weed, for example, it's not growing there because it's a problem – it's actually growing there because from nature's perspective, and successional, it's adding something, it's part of the solution, from nature's perspective. So, I think, to put that more succinctly, to be regenerative is to look and to acknowledge that nature does have the solutions, rather than to override her with what we think are the right solutions or the right management techniques. It's almost like we've got to think like an ecosystem and, again, Rachel's mentioned we've got to have a holistic thinking model where we see the complexity of stuff, versus the complicatedness of it. Because it is complex, but that doesn't mean you have to make it complicated. And, I think the other thing that comes up for me is really accepting that everything is interconnected and it's entwined. And, I think to be regenerative, you need to really honour and acknowledge that interconnectedness.' – Pastoral FG</p>

5 Make context-specific decisions

Context varies from place to place, person to person and season to season – adapt your system and practices to suit

Description:	Example quotes:
<p>The need to know and understand your context featured strongly in all focus groups. Context includes your physical environment, physical infrastructure, community, markets, skills, knowledge, and goals.</p> <p>This principle encompasses many different elements, including:</p> <ul style="list-style-type: none"> • Be really clear about values, goals and your “why”. Conforming is the easy path but not necessarily the most rewarding. • Assess the likely impacts of different decisions against <i>all</i> your goals, rather than letting any one goal dominate, e.g. profit at the expense of well-being. • Systems, practices, and genetics should reflect each unique context – there is no prescription – and they will likely change over time. • If adopting practices or ideas from elsewhere, don’t necessarily expect the same outcome – adapt them to your context. • Consider problems or possible solutions with your whole, complex system in mind – everything is connected. <p>Recognise there may be short-term trade-offs in order to manage risks, finances, and family and community dynamics while developing new systems (i.e. be pragmatic about how much and how fast you change).</p> <p>This principle has strong foundations in Holistic Management and the well-known Principles of Soil Health from the United States. It also has</p>	<p><i>‘Context is decisive, and it varies from season to season, person to person, area to area.’ – Pastoral FG</i></p> <p>‘Doing the best we can for the [whole] farm – taking all factors into consideration [when making decisions]’ – Viticulture FG</p> <p>‘At the end of the day, what we’re doing here is we’re making money in a way that my lifestyle and the environment can handle. Number one is making money, because if we’re not, we’re not in business. All three of them are important, but we can’t do it if we’re not making money.’ – Arable FG</p> <p>‘It’s the right thing, in the right place. A lot of farming is that.’ – Viticulture FG</p> <p>‘Curiosity has got the better of me in this space. How far can we take our system with a lot less inputs, especially synthetic inputs? We’ve been told we can’t increase our organic matter, because our levels are extremely high – is that true, can we push that, can we take it further, can we push it right through the roof and become totally resilient?’ – Arable FG</p> <p>‘[name] has been one of our biggest influences on what we’re doing here, because he’s been doing it a long time. And, for us to go and implement things, we wanted to see “can it be done, not just in one or two years, but over time?”. So, [name’s] influence on us has given us the confidence to go for it. And, so now we’re helping others out – like</p>

Description:	Example quotes:
<p>strong connections to what participants considered important components of a 'regenerative mindset', including:</p> <ul style="list-style-type: none"> • Flexible and adaptive approach • Outcome focused (including what makes you happy) • Profit or success beyond just financial • Looking to solve the root cause of problems and exploring a range of possibilities to fix it • Transition at your own pace – it's not an all or nothing approach • Acknowledging that aspects of some mainstream NZ systems follow some regenerative principles - it's about looking for other areas of the system to improve on. 	<p>[name] and [name] and [name] and [name] are. It's that farmer learning – going and seeing what [name's] doing, listening to him, seeing his operation – was one of the biggest key ways for us to learn.” – Pastoral FG</p>

6 Question everything

Be curious, question your beliefs and test different ideas

Description:	Example quotes:
<p>A clear message from the focus group discussions was that every practice on the farm should be continually questioned and that nothing was off the table. It was clear that this aspect of their decision-making was something the participants really enjoyed – giving themselves permission to question everything they do and consider any alternative possibility. This principle was considered an important aspect of a ‘regenerative mindset’.</p> <p>One approach to this is to consider the potential negative impacts of each practice on the whole farm ecosystem and ask:</p> <ul style="list-style-type: none"> • is this actually leading to some benefit (short term and/or long term)? • is this addressing the root cause of the problem, or just treating a symptom? • how can I mitigate potential negative impacts if I can’t find a genuine alternative? <p>Closely connected to this was the importance of observation, using farmers’ intuition and more</p>	<p><i>‘The number one thing is actually to start questioning and thinking about the practices that you’re doing and what their impacts are on the whole system, basically, and an awareness that the whole system is more than just your inert medium of the soil, some chemistry that’s growing your crop – it’s actually a much more complex system...’ – Viticulture FG</i></p> <p>‘Whatever I’m doing, whatever decision I’m making, I ask the question, “Is it going to be detrimental to the soil?” And, if it is, if I’m spraying out a paddock, I mitigate it with humates, lower rates of Roundup. Do I need to drench my lambs and do faecal egg counts instead? Is the pasture ready to be grazed? Do I need to leave it another day? Do I need to go to another paddock? Do I need to spray this paddock out?’ – Pastoral FG</p> <p>‘Recently my viticulturist said, “Why do we kill all the weeds?” and that’s pretty confronting for us, because generally that’s what we aim to do. I think, for us, regen’s been permission to stop and question everything we’ve always done, and it’s really opened up some really interesting discussions that at the time they started it was like “Jesus, really? Why are we even talking about this?”, but when you go further into it, why <u>are</u> we doing that? We’ve questioned everything, really. I think it’s just given us permission to throw anything on the table.’ – Viticulture FG</p> <p>‘Questioning why we’re doing things – and it’s not, “Should we be organic or should we be the other?” It’s actually questioning the inputs and what we’re doing, from a soil health, biological, ecology perspective...’ – Viticulture FG</p> <p>‘I’m always digging holes and observing what’s going on.’ – Pastoral FG</p>

Description:	Example quotes:
<p>structured observational skills to help identify cause and effect of positive and/or negative outcomes.</p> <p>Another outcome of this questioning is an increased sense of excitement and autonomy when it comes to on-farm decisions.</p> <p>This principle has strong ties to one of the key messages from Holistic Management – ‘always assume you are wrong’. It also has strong connections to what participants considered important components of a ‘regenerative mindset’, including:</p> <ul style="list-style-type: none"> • Always questioning, learning and improving with no limits to what’s possible • Open minded to anything • Open to the idea that what you’ve done in the past might not have been the best thing / being humble and willing to see a bigger picture you may not have seen before • Comfortable being wrong • Willingness to be open and vulnerable • Inclusive and non-judgemental culture. 	<p>‘I do like noticing the birds, and listening to the frogs in the wetland, and watching stock as they go onto a break and seeing what they’re eating and what they’re not eating and seeing an increase in bees and worms, and digging holes – observation’s a big thing.’ – Pastoral FG</p> <p>‘How did we go down a road that we believed that just growing rye grass and clover as a monoculture, mass-production could, in any way, shape or form be beneficial to animals health. Then you start down the regen of multi-species pastures and it all just makes so much sense – watching that latest Netflix one, Kiss the Ground, like you just watch that and it just, the whole, it makes so much sense. How did we go so far in the wrong direction? How did us humans decide that different species were weeds, like if an animal eats it and it’s beneficial to their health, who are we to decide that they were weeds and we should only be growing clovers and ryegrass?’ – Pastoral FG</p> <p>‘For us, it’s really “What can we do better?” And you can look at anything – nothing’s off limits or out of bounds. Just chuck it all up in the air, then let it fall upside down and then put it all together.’ – Viticulture FG</p> <p>‘What I see is that people with a regenerative mindset see problems as opportunities, rather than big roadblocks.’ – Pastoral FG</p> <p>‘To be better at viticulture you go to a viticulture conference, but to be better at regen, you’re best off to engage with people right across the spectrum of producers – I’ve learnt some really interesting things from sheep farmers or whatever – you just seem to be able to engage with such a wide group of people.’ - Viticulture FG</p> <p>‘It’s just having an open mind, I think, at the end of the day is what it boils down to – being open to new ideas is how, sort of, I’ve got to be where we are heading. If you have a closed mind, you’re never going to try anything, are you? You’re just going to do what the rep tells you and buy the recipe and, if it fails, it’s probably the contractor’s fault and nothing that you’ve done. Try new things.’ – Pastoral FG</p>

7 Learn together

Connect with like-minded peers to speed up the learning journey – include perspectives different from your own

Description:	Example quotes:
<p>Continuous learning is a behaviour that stretches across multiple principles. This learning takes many forms, including learning alongside others. Many of the participants were involved in networks such as Quorum Sense and/or Red Meat Profit Partnership groups. Much value is placed on being able to learn from the experiences of others who have already tried practice or system changes, both successful and unsuccessful.</p> <p>This collective learning is heavily underpinned by many of the aspects of a regenerative mindset that participants articulated, including:</p> <ul style="list-style-type: none"> • Always questioning, learning and improving with no limits to what's possible • Embracing diversity in nature, people, worldviews • Taking responsibility not just for yourself but for others and the environment around you • Collaborating – with nature and people • Generosity and abundance mentality • Possibility mindset – learning from others • Willingness to be open and vulnerable • Inclusive and non-judgemental culture. 	<p><i>'To be better at viticulture you go to a viticulture conference, but to be better at regen, you're best off to engage with people right across the spectrum of producers – I've learnt some really interesting things from sheep farmers or whatever – you just seem to be able to engage with such a wide group of people.'</i> - Viticulture FG</p> <p>'The amount of collaboration, you know, very, very high levels of collaboration, which I have to say I don't think I've ever seen before, so I think that's a really fundamental part of this thing is super...collaboration is just off the... charts!' - Viticulture FG</p> <p>'The word I wrote down there was I guess an openness, which I guess encompasses our curiosity, but openness to be part of the wider community and to be sharing what we're doing and equally listening to and valuing what other people are doing.' – Pastoral FG</p> <p>'There's not one answer – it is context specific – and there's no one way of seeing the world. If all of us went outside and looked at something, we might, in all likelihood, see some of the same things, but we also might see very different things when we look. That's embracing diversity, that's embracing not just the diversity we've put in our pastures, but the diversity of who we are and how we view things. And if we can integrate diversity and also integrate more inclusion and, I think, more equity into our activities and our management and possibly our culture.' – Pastoral FG</p>

Description:	Example quotes:
<p>Another notable aspect of this principle was where participants sought knowledge and who's perspective they valued. Much emphasis was placed on engaging with a broad diversity of perspectives including different farm sectors/systems, professions, countries, cultures, etc. This is consistent with participants' views that farm ecosystems and their associated business, communities, markets, etc., are complex and therefore a broad range of knowledge and perspectives are required to help understand the whole.</p>	<p>'When you look at people who are adopting and, you know, early adopters, they tend to be people who are really curious...whether it's through your own observations or through you're curious to learn so you listen to podcasts or whatever it is. I think curiosity's a really big driver for us to expand our horizons and understanding.' - Pastoral FG</p>

8 Failure is part of the journey

Push beyond your comfort zone – small failures provide the best learning opportunities

Description:	Example quotes:
<p>The principle of always trying something new and viewing failure as a valuable learning opportunity was emphasised by the focus groups.</p> <p>Participants described how they no longer view failures as negative experiences, but instead consider failures as valuable learning opportunities that will deliver the greatest gains in the long term. Participants described how they prioritised establishing on-farm trials that push them out of their comfort zone to test ideas and new practices before deciding whether to implement them across their whole farm. In summary, the participants' advice was:</p> <ul style="list-style-type: none"> • Always be running trials, including control areas or blocks to test whether your current practices are working • Fail at a scale that you can afford, whether it be the corner of a paddock or the whole farm • Have a 'practice paddock' where you really challenge yourself – it's a faster way to learn than only making incremental changes • Share your experiences with other farmers and encourage them to do the same. <p>It was evident that this process of trial, failure, and learning was exciting for participants, and they were very willing to share their failures as well as successes. This contrasts with the common perception that farmers prefer not to be vulnerable and just focus on what is going well.</p>	<p><i>'Always trying something new. Got to be trying something new, otherwise you don't learn anything, do you?'</i> – Pastoral FG</p> <p>'I like the on-farm trial and error. Taking one paddock out isn't going to blow your budget, if you want to try multispecies or something like that. That's essentially how I got into it, is chucking one paddock in, of everything and seeing what it was going to do – it was only 2 ha, but you learn heaps from that 2 ha that you can implement on your whole farm.' – Pastoral FG</p> <p>'As farmers, we have to be comfortable to do that, and know that sometimes we might end up with our face in the mud – laugh a bit, keep your humour!' – Pastoral FG</p> <p>'It's almost enjoyable now to be wrong. And that's been one of my biggest breakthroughs. Instead of having to prove I'm right, being wrong is almost liberating. It's hard to articulate that, but don't be scared to be wrong. Failure is not failure, it's just wonderful learning.' – Pastoral FG</p> <p>'No system is perfect. If you're merrily farming away, doing the same thing you did last year and the year before, you're not thinking hard enough. The most regenerative people are the ones who changed the most things year-to-year and conducted the most experiments and are never satisfied with how things are going. And, yes, you might get some components of your system that are humming along nicely, but there</p>

Description:	Example quotes:
<p>Observation and monitoring were considered key skills to maximise learning opportunities.</p> <p>Similar to the principle 'Learn together', embracing is heavily underpinned by many of the aspects of a regenerative mindset that participants articulated, including:</p> <ul style="list-style-type: none"> • Failure as an opportunity to learn • Seeing problems as opportunities • Comfortable being wrong • Willingness to be open and vulnerable • Possibility mindset – learning from others • Looking to solve the root cause of problems and exploring a range of possibilities to fix it • Inclusive and non-judgemental culture. 	<p>will always be something else to question and learn and try and do differently.' – Viticulture FG</p> <p>'As confidence rises, observation falls... Sometimes the more confident or cocky you get, that's when you can get into that trap of not adjusting or not learning. So, it's a constant contrast of being vulnerable to being 'wrong', but also confident to make good decisions and implement change which is quite drastic but takes you a long way.' – Pastoral FG</p> <p>'If it's a failure, it's a failure, but we'll learn something from it. You've almost got to fail to learn and sometimes you have a win and sometimes you don't.' - Pastoral FG</p>

9 Open and flexible toolbox

Try to use practices that help improve ecosystem function while keeping others up your sleeve for if or when you need them

Description:	Example quotes:
<p>This principle reflects the non-prescriptive attitude that participants have towards RA. Rather than a list of practices that are or are not allowed, regenerative farming is considered to be a pragmatic and flexible approach to transition away from potentially harmful practices, towards practices that better support ecosystem health and function and therefore farm system performance and profitability.</p> <p>It was clear that for all participants the goal was to reduce and, if possible, eliminate tools or practices they thought were particularly harmful to soil biology or insects in particular. However, they valued retaining the ability to use these tools or practices if necessary to either save a crop or fix a short-term problem. This was identified as a key difference between regenerative and organic farming. In some cases a regenerative transition was viewed as a potential pathway to a future 'regenerative organic' status integrating the benefits of both approaches, including marketability.</p> <p>Another aspect of the discussions was around the potential judgement that can be associated with certain practices. Participants preferred a more open-minded approach that could be summarised up as: <i>'There are no right or wrongs, just actions and consequences.'</i></p> <p>Responsible use of any tool was encouraged, including that farmers should educate themselves about the potential harm that different tools or practices could cause. Responsible use could relate to when different practices might be appropriate or the specific ways in which</p>	<p><i>'For us, having an open toolbox is quite important for the regen – because unlike organics where you're limited in what you can do – we're really questioning whether the negative effects you get from cultivation are better or worse than the negative effects you get from herbicide. Both are essentially tools to get your crops established, so which one should you choose? That's an ongoing area of experimentation.'</i> – Viticulture FG</p> <p><i>'[Regen is] a toolbox for farmers, it's not, "We're this and you're that" - it's just a toolbox of different practices that is useful.'</i> – Viticulture FG</p> <p><i>'If copper is the thing that gets a crop off and keeps you in business, use copper. If Roundup is the thing that gets a crop off and keeps you paying the bills, you use Roundup. Our perspective on the whole thing is we want the toolbox to be as wide open as possible so that we have access to these things. And the fact that I might not use copper for the next 10 years, because I don't like it, doesn't mean I don't want to have access to it. And, I guess that's the fundamental thing with regen ag, it might be against your principles to do something but, if it's necessary, you do it, then you re-set and start again.'</i> – Viticulture FG</p> <p><i>"If I do use a synthetic, I always buffer it."</i> – Pastoral FG</p> <p><i>"For us, most of the things we do, come back to soil health and a holistic approach to managing soils."</i> – Pastoral FG</p>

Description:	Example quotes:
<p>they are used. For example, most participants described buffering synthetic fertilisers and chemicals when they used them, also applying them at lower rates to reduce risk of nutrient loss or harm to biology. Another example was growing multispecies winter crops rather than monoculture winter crops to reduce pugging, leaching and erosion.</p> <p>The principle of an 'Open and flexible toolbox' is closely associated with the following aspects of a regenerative mindset that were identified by participants:</p> <ul style="list-style-type: none"> • Flexible and adaptive approach • Always questioning, learning, and improving with no limits to what's possible. • Outcome focused • Promoting life and diversity, not killing and controlling • Open minded to anything • Long-term perspective • Looking to solve the root cause of problems and exploring a range of possibilities to fix it • Take it at your own pace – not all or nothing approach • Acknowledging that aspects of some mainstream NZ systems follow some regenerative principles – it's about looking for other areas of the system to improve on. 	<p>'There's sort of things in the context of viticulture that when you apply that mindset to it, you go "Wow! How can we introduce diverse cover crops?" And pump a whole lot of stuff into your soil to feed the soil, "how can we not disturb it so much?" And then that immediately takes you down the line of "How do we minimise our broad spectrum fungicides, pesticides, all of that?" and the regenerative mindset says "Well, copper's just as bad as a chemical fungicide, it's the action and the ecological impact that is important". But that's not to say stop using them. These are things we need to work on in our system to try and minimise impact and find alternatives.' – Viticulture FG</p> <p>'If somebody said, "I've got a big, open toolbox", I could get excited... Don't throw any of the tools out. Just be responsible for the impact, both negative and positive of your choices of tool... Use them responsibly, but know all the implications, both positive and negative. You can use a bit of Roundup, but what are the implications if you used 4L or you used 2L and you buffered it - again, it comes back to understanding, doesn't it?' - Pastoral FG</p> <p>'I've always liked that saying, "There's no right or wrong, just consequences" and that comes back to understanding the impacts.' - Pastoral FG</p> <p>'The minute you take right and wrong out of it, you can be a bit more objective and I suppose that's a word we haven't used, which I think is perhaps an important one. If you can just be objective and take all the emotion out of it and the judgment out of it, which is a lot of what we get when we get into the positional and oppositional arguments we have with one another and ourselves.' - Pastoral FG</p>

10 Plan for what you want; start with what you have

Transitions take time –clear goals, planning and monitoring are key

Description:	Example quotes:
<p>During the focus groups it was clear there had been a great deal of learning and experience about how to successfully make the transition to regenerative practices. Key behaviours identified include: identify your biggest limiting factors; focus on doing a few things well; plan (don't just wing it); and monitor progress.</p> <p>These behaviours are sure be common in the wider farming community. However, participants considered them essential for successfully managing regenerative transitions, because this requires farmers to shift towards systems that rely more on complex natural processes. These need to be managed well in advance of the current season or cash crop. Examples could include using a mix of cover crop species designed to support following cash crop or destocking early enough to build pasture covers before entering low-growth periods.</p> <p>This principle also emphasises that transitioning a farm system can take time. Some systems/practices that are successfully used by farmers further along the regenerative continuum may not be possible or effective until farmers' knowledge, tools, soil health and/or diversity have increased. Withdrawing quickly and completely from current practices – 'going cold turkey' – was not recommended.</p> <p>A suggested starting point was to identify the biggest limiting factors for a given farm, which could be physical (e.g. soil compaction), biological, chemical/mineral, genetic, people/knowledge/connections, business structure or otherwise. Address the biggest limiting factors first</p>	<p><i>'...as you delve into understanding the whole and how it works – if you start with a bit of an open mind – it actually leads you down the path of changing your suite of practices to do things like cover cropping, less chemical application – but you don't necessarily do all that at once. Part of the regenerative process is actually developing an understanding of that and working through what you're doing to see how your system can evolve. It could be right at the start of it – you could have that mindset and be working with your system currently and going, "Right, I do everything conventionally, but what's a couple of things I can pick off?" As soon as you start evaluating what you're doing in terms of, "These are having negative effects and can we do better?"; I think you start going down that path.'</i> – Viticulture FG</p> <p>'The planning starts right back 12, 18 months before we start planting crops – what are we going to do in 18 months, come Spring, how are we going to manage that soil? How are we going to manage the inputs? How are we going to manage the crops grown before and the crops grown afterwards? So, there's a huge role of planning before we actually get to the paddocks. It's mainly to enhance that soil – soil resilience in our climate, with the rotation we do and the complexity that's in our system.' – Arable FG</p> <p>'That's why I haven't gone all in with regen ag...because I'm doing what I'm doing with things like cover crops, residue retention, no tillage...to try to give my soil time to catch up and help it to learn its natural</p>

Description:	Example quotes:
<p>before moving on to others. Generally speaking, participants emphasised improving soil health and maximising photosynthesis as solid starting points for anyone beginning their transition. It was also considered important to focus on doing a few things well, rather than lots of things averagely, thereby keeping the management system simple.</p> <p>Aspects of a regenerative mindset identified by participants and relating to this principle include:</p> <ul style="list-style-type: none"> • Flexible and adaptive approach • Outcome focused • Aligned values, goals, and behaviours • Observing the whole ecosystem and understanding how nature and living systems work • Looking to solve the root cause of problems and exploring a range of possibilities to fix it • Take it at your own pace – not all or nothing approach • Acknowledging that aspects of some mainstream NZ systems follow some regenerative principles – it’s about looking for other areas of the system to improve on. 	<p>function again. Because I just don’t think we could go cold turkey with our soil – it’s just too biologically inactive to be able to sustain the level of production that farmers expect out of land now – unless you’re much further down the track, that is.. – Arable FG</p> <p>‘If we keep everything too broad, it becomes an overload of what we’re trying to achieve. So, I think we’ve got to have a focus around it and focus on that one particular thing (or two or three things) for a period of time.’ – Pastoral FG</p>

11 Maximise photosynthesis (year-round)

Treat your farm like a solar panel – bigger green leaf area supports greater photosynthesis, meaning more food for soil microbes and improved soil health

Description:	Example quotes:
<p>Focus group participants strongly emphasised maximising photosynthesis as a core principle underpinning their systems.</p> <p>This principle relates to the process where plants feed soil microbes by leaking soluble carbohydrates (sugars) out through their roots as exudates. Without living roots and active photosynthesis, energy supply to soil microbes is limited and therefore the many positive functions of soil microbes will also be limited. The practice of over-grazing, whereby plants are not given adequate time to recover, was considered to reduce the amount of root exudates and contribute to shallow rooting systems with decreased resilience to drought and increased nutrient loss.</p> <p>Participants were very pragmatic about this principle. In some systems, having living roots and/or active photosynthesis 365 days a year has not yet been achieved, although participants described various ways in which they were looking to remedy this. Examples include practices such as multispecies winter cropping (sowing annuals with perennials that regrow after grazing), cover crops between cash crops, intercropping, companion cropping, and managing grazing to ensure sufficient green leaf area after grazing or harvest to keep plants photosynthesising.</p> <p>This principle is very similar the Principle of Soil Health from the United States – ‘Keep living roots in the ground’.</p>	<p><i>‘This year, with our [multispecies] winter crop, [it’s] just full pasture production now – we’ve just got feed like we’ve never had in a spring – the opportunities are just huge at the moment and we’re not losing the sediment off those paddocks. We’ll re-drill that to new pasture when the time is right – probably in 2 or 3 weeks – there’s no pressure to get that back in by the first of November, because it’s already growing.’ – Pastoral FG</i></p> <p>‘For the soil building part of it, I like the idea of maximum photosynthesis, all the time. And that’s something that we sort of miss out in vineyards quite a lot, ‘cos they look so tidy a lot of the time and your vines are only in leaf, in full leaf, for probably 4 months of the year and in leaf at all for about 6. And you can grow a whole lot of other plants in the vineyard to achieve maximum photosynthesis the rest of the year. So, supporting the ecosystem of the vineyard to conduct its photosynthesis at a maximum for 365 days of the year, while still taking a commercial crop of grapes off, I think is one of my guiding rules of thumb. I don’t want to do anything that slows down that capture of energy. So, it’s basically putting the maximum amount of energy into the system as a whole, not just the grape vines but everything.’ – Viticulture FG</p> <p>‘It’s the living roots that feed the soil microbes that keep minerals mobile and plant available. Once we remove the living roots, we remove</p>

Description:	Example quotes:
	<p>the ability to feed the microbes and the minerals that they were making mobile become immobile and unavailable to plants. There is a lag time from when we reintroduce living plants to getting those minerals mobilised, so it's in our best interests to keep plants growing all the time.' – Arable FG</p> <p>'Where you've got "Treat your farm as a solar panel" – I mean, if you think about it, everyone's growing grass year-round, they are treating their farm as a solar panel. It's always as if we need to be more concise with what we're saying there. Do we need to maximise our farm as a solar panel?' – Pastoral FG</p>

12 Minimise disturbance

Keep the soil covered and limit disturbance from chemical application, soluble fertiliser, machinery, and livestock compaction

Description:	Example quotes:
<p>This principle was a strong theme in all focus groups.</p> <p>Some of the reasons for minimising bare soil included increasing solar energy capture, regulating soil temperatures, increasing water infiltration, supporting nutrient cycling, and reducing erosion and compaction. The pastoral focus group noted that bare soil <i>between</i> plants in permanent pastures was also an issue and often caused by overgrazing.</p> <p>In terms of disturbance, participants emphasised that it was not an ‘all-or-nothing’ approach to avoiding disturbance, but reducing unnecessary disturbance and being proactive about helping the soil ‘bounce back’. Examples could include moving from ploughing to shallow cultivation or no-till, or reducing the number and rate of chemical applications, or lifting grazing residuals and reducing pugging. Soluble fertiliser and chemicals were also considered sources of disturbance to soil and plant microbiomes – participants described how they were reducing or eliminating the use of these tools to minimise this disturbance, as well as incorporating other tools such as buffering with carbon or adding biostimulants to try and reverse any negative impacts. Reduction rather than elimination was often considered a pragmatic and safer transition approach while farmers developed more skills and confidence and farm ecosystem health improved.</p> <p>This principle is very similar to two of the Principles of Soil Health from the United States - ‘Do not disturb’ and ‘Cover and build surface armour’.</p>	<p><i>‘I hate bare soil, I really do. Everything is losing with bare soil.’ – Hamish B</i></p> <p>‘Working towards reducing unnecessary disturbance, but then, how do we quickly recover when there is a need to disturb the soil?’ – Arable FG</p> <p>‘Really focusing on maintaining groundcover, because as viticulturalists we are quite obsessed with killing everything other than the vines.’ – Viticulture FG</p> <p>‘Having bare soil for microbes is like having humans out in the heat or the cold, naked and without food. It is living plants that feed soil microbes as well as covering and protecting the soil and regulating temperature’ – Arable FG</p> <p>‘As you minimise bare soil, you don’t just enhance soil moisture, you improve soil loss, nutrient cycling, there’s a whole lot of things you improve, if you don’t have bare soil.... Sediment and nutrient loss.... It’s not just moisture, it’s also temperature...soil temperature and all that gets affected.’ – Pastoral FG</p>

13 Harness diversity

Diversity benefits the whole ecosystem– microbes, insects, plants, birds, livestock, and your community

Description:	Example quotes:
<p>The value of diversity was a dominant and wide-ranging theme throughout all focus groups. Diversity was considered valuable below-ground (soil microbes), above-ground (plants, insects, birds, livestock), and at a landscape level (pasture, crops, trees, wetlands, and so on). It was also considered valuable in relation to different knowledge systems, perspectives, and cultures. It represents an almost universal principle for working with living systems (which include people).</p> <p>Participants described how they used diversity to improve the health, function, and resilience of their farm systems and businesses. Examples included using a range of plant species in pastures or cover crops as this brings variation in root systems, growing periods, nutrients that are cycled, types of soil microbes or insects that are fed, and habitat that is created.</p> <p>While focus group conversations generally considered increasing diversity to be a positive thing, there were some caveats. In arable areas where certified seed crops are grown, some non-traditional pasture or crop species pose a cross-pollination risk to seed growers. These arable farmers (and their neighbours) therefore work with a more limited range of species. Despite this, the arable farmers felt they had enough species in the toolbox to achieve the desired diversity results.</p> <p>Participants also described how their views on weeds and pests had changed. They described questioning whether so-called weeds were</p>	<p>We're right at the start, but some of the key things we're thinking about are the concept of underground livestock and doing everything we can to have diverse plants and diverse livestock.' – Viticulture FG</p> <p>'The more you build the life in your soil – both above and below – the better the digestion of that system and what you end up doing is not building soil – you're growing it.' – Pastoral FG</p> <p>'I can only grow about half of the cover crop mix that I would ideally like to because I can't grow annual ryegrass, because I grow perennial ryegrass seed crops, I've got oil seed rape so I can't grow mustard, I've got radish so I can't grow daikon radish, there's quite a few examples of what I can't do. But that doesn't worry me all that much, I just work with what I can. Then I've got to take into account what my neighbours are doing as well.' – Arable FG</p> <p>'Diversity is like our communities. We want as many different services in our communities as possible. The more services we have, the more resilient our communities are. It's no different in the soil. If we have lots of different services that community is much more resilient' – Arable FG</p> <p>'I tell people that come and look at my cover crops, "Look, biodiversity in your vineyard isn't a bit of native planting over by the pond, it's what's growing and touching the roots of your grape vines, it's the network of microbes in your vineyard". And that's probably the biggest thing I'd like to sort of get people's minds focused on about regen ag – it's actually</p>

Description:	Example quotes:
<p>actually a problem requiring intervention or simply an aesthetic issue. They described putting effort into understanding <i>why</i> weeds were present in the first place – assuming they were symptoms of their management (such as anaerobic soils favouring dock) and questioning whether management changes could address the <i>cause</i> of the weeds in the first place.</p> <p>Farmers emphasised monitoring beneficial insects as well as pest species before resorting to any insecticide. Insect pests were not considered a threat at low levels if beneficial predators were also present. The choice not to use an insecticide required close monitoring.</p> <p>This principle is very similar the Principle of Soil Health from the United States – ‘Mix it up’.</p>	<p>the stuff right down in that small scale about what you’re doing that matters, not the sort of out-of-district bit of native planting that your company funded and if your company is still doing conventional whatever it is....’ – Viticulture FG</p> <p>‘I really agree with the guys on the nuances of weed control, like sometimes weeds are okay and sometimes they’re not, and there’s a big difference between weeds in the mid-row and weeds in the vine-row and whether they’re there in spring or summer or autumn and all that sort of stuff and whether it’s a weed with an aroma associated with it or one that tillers up into the canopy or one that stays flat, one with a tap root, one with a fibrous root, one that’s going to stay for a long time, one that’s really easy to get rid of, one that the sheep eat, one that the sheep don’t eat and all these things, there’s so many different weeds.’ – Viticulture FG</p> <p>‘How did we go down a road that we believed that just growing rye grass and clover as a monoculture, mass-production could, in any way, shape or form be beneficial to animals’ health. Then you start down the regen of multi-species pastures and it all just makes so much sense – watching that latest Netflix one, ‘Kiss the Ground’, like you just watch that and it just, the whole, it makes so much sense. How did we go so far in the wrong direction? How did us humans decide that different species were weeds, like if an animal eats it and it's beneficial to their health, who are we to decide that they were weeds and we should only be growing clovers and ryegrass?’ – Pastoral FG</p> <p>‘Diversity is huge. Ryegrass is essentially a bit of a pest around here.’ – Pastoral FG</p>

14 Manage livestock strategically/holistically

Livestock are a powerful tool for building biological function and fertility in our soils, when managed appropriately

Description:	Example quotes:
<p>Participants considered livestock a powerful and valuable tool for improving the health and productivity of any farm system, provided they were managed appropriately. If not managed appropriately, they were considered a potentially destructive tool. The perspectives and approaches to this principle differed across the focus groups.</p> <p>For arable and viticulture growers the primary role of integrating livestock into their systems was to speed up nutrient cycling and help build fertility and soil health, especially by grazing cover crops and residue. Animals are used to graze a portion of cover crops where their manure and urine quickly become available for subsequent crop growth, thereby averting excess nutrient lockup. The remaining cover crop and residue are often trampled to provide soil cover and release nutrients more gradually as the following crop grows.</p> <p>For pastoral farmers, how they sought to manage livestock was more nuanced. In addition to the arable and viticulture growers focus on nutrient cycling and soil cover, their emphasis also included shifting fertility around the farm using multiple shifts per day rather than allowing stock to camp in preferred areas. Pastoral farmers had a very adaptive approach to grazing management, depending on the season, weather, pasture covers, stock class, and so on. Grazing rotations are managed to ensure pastures have adequately recovered before grazing (recovery time varies greatly across the seasons), at times aiming for livestock to take one bite off each plant and then move on in order to</p>	<p>I believe animals are a huge part and have a huge contribution to the soil health. That's why we run lambs in our rotation around the cropping system. Basically, to me they are like little fertilisers, little fertiliser spreaders – they get around and turn the cover crops into humus and basically condition the soil in a way... Not only that – also they actually allow a lot of the cover crops seeds to grow, they open up – so, what we found this year, they grazed the pasture first, at winter start, they grazed that pretty short before they actually touched anything else, so that allowed a lot of the vetch, clover and everything else to get pretty well established, that was just another observation this year.' – Arable FG</p> <p>'By the time the peas got to about 100mm high, they really started to suffer and the reason they did was because the nutrient – I underestimated how long it would take for the nutrient to leave the dying cover crop and return back to the soil again and so I had a real nutrient deficit, especially a nitrogen and sulphur deficit in that early period of the spring – ammonium sulphate fixed it, but eventually it returned. So, now what I do is that I graze about 50% of the cover crop before I plant it out in the spring and that allows 50% of the nutrient to be excreted out the back of the animal in a plant-available form, so I don't end up with that huge amount of lock up at the end of the winter or the start of spring.' – Arable FG</p>

Description:	Example quotes:
<p>maximise both plant photosynthesis and animal performance. During some parts of the year, farmers graze at high densities and deliberately get animals to trample some of the pasture sward ('laying down litter') to both encourage nutrient cycling and keep the soil protected from sun, wind, and heavy rain.</p> <p>All focus groups discussed the importance of grazing management to improve the mobilisation and cycling of nutrients already in the soil. Fertiliser inputs were still viewed as an important tool for most farmers, especially those transitioning their systems. There was some uncertainty as to how much external fertiliser inputs would be required once a farm had healthy, functioning soils (and this would likely be very context-dependent).</p> <p>There are a wide range of terms to describe this approach to grazing that appear quite similar including: Adaptive Multi-Paddock (AMP) grazing, holistic grazing, mob grazing, regenerative grazing, etc. It is clear that this approach to grazing management has some distinct differences to mainstream rotational grazing, although they share certain attributes. The former could potentially be considered an extension of the latter.</p> <p>This principle closely relates to the Principle of Soil Health from the United States – 'Grow healthy animals and soil together' (previously known as 'Incorporate livestock').</p>	<p>'Traditionally, in Canterbury at least, the mixed cropping thing was what kept things in-check for a long time – having that pastoral phase before the more depletive cropping phase, which can be really hard on the soil and can drive things down from an organic matter perspective and then the pastoral phase would build things back up again – but that's not where things sit so much now, it's more intensive cropping. So, thinking about well "is there space to have a bit more of that into the system, with the animals?" Is that a key principle or is it another one that is more subjective, depending on the system?' – Arable FG</p> <p>'When we started placing our mobs strategically, we grew a lot more grass, as opposed to just putting 'fertiliser' on those parts. I'm just watching results or outcomes and the mob grazing, the dung and urine placement, the density, the overnight mob placements, are just transforming what we're doing, without 'fertiliser'. I'm not saying we can go without fertiliser – that's not the issue – it's management, which is turning our production around a lot.' – Pastoral FG</p> <p>'On our farm, on the hills, using a round of high-density grazing, instead of the cows going over the paddock and coming back to the flats to sit down, they have to stay on that hill so that everything is spread out nicely and then they're moved on. We get a more even graze and better fertility transfer on the hill. [...] When I get a bit of a flush [of growth] in the next month, I'll do four or five shifts a day.' – Pastoral FG</p>

15 Conclusion

The principles described in this report should be considered only as a starting point for farm-level principles in Aotearoa New Zealand. We did not attempt to identify principles beyond the farm level (i.e. community, sector or national level). Different people or organisations may take and evolve them for themselves, or incorporate them alongside principles that have been determined for different areas of focus (i.e. economics or landscape-scale biodiversity). While generally constrained to farm-level, we hope that these principles will also offer useful insight and guidance for other practitioners and professionals also interested in exploring or supporting RA.

Thanks to the participants and reviewers who generously donated their time, wisdom and expertise to this research and report. It was clear from the discussions that the understanding of regenerative principles and how to articulate them will continue to evolve and perhaps these principles will be revisited sometime soon in a different context.

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