Regenerative Agriculture in New Zealand

Dr Gwen Grelet & Sam Lang

What we will talk about

- **What is Regenerative Agriculture (Regen Ag)**
  - Descriptions
  - Examples of Regenerative farming systems in NZ
- **Building the scientific evidence in NZ**
  - Emerging findings from pilot exploratory study
  - Nationwide cross-sectoral think piece on Regen Ag

What the bleep is Regenerative Agriculture?

The Five Principles Of Soil Health

SOIL COVER: ***Keep plant residues on the soil surface.*** Look down, what percentage of your soil is protected by residue? Erosion needs to be minimized before you can start building soil health.

LIMITED DISTURBANCE: ***Minimize tillage as much as possible.*** You will start building soil aggregates, pore spaces, soil biology, and organic matter.

LIVING ROOTS: ***Keep plants growing throughout the year to feed the soil.*** Cover crops can add carbon to the soil, providing a great food source for micro-organisms. Start small to find the best fit for your operation.

DIVERSITY: ***Try to mimic nature.*** Use cool and warm season grasses and broad leaf plants as much as possible, with three or more crops and cover crops in rotation. Grassland and cropland plant diversity increases soil and animal health.

INTEGRATING LIVESTOCK: Fall/winter grazing of cover crops and crop residue increases livestock's plane of nutrition at a time when pasture forage quality can be low, increases the soil biological activity on cropland, and improves nutrient cycling. Proper grassland management improves soil health.

USDA

South Dakota Soil Health Coalition

6 PRINCIPLES

Of Soil Health

1

Know your context.
Our soil health practices are a reflection of ourselves and our stewardship of the land.

2

Do not disturb.
In nature, there is no mechanical or chemical disturbance.

3

Cover and build surface armor
to protect the soil's "skin."

4

Mix it up
with a diversity of plants, microbes, insects, wildlife, livestock. Mother Nature did not grow monocultures so why should we?

5

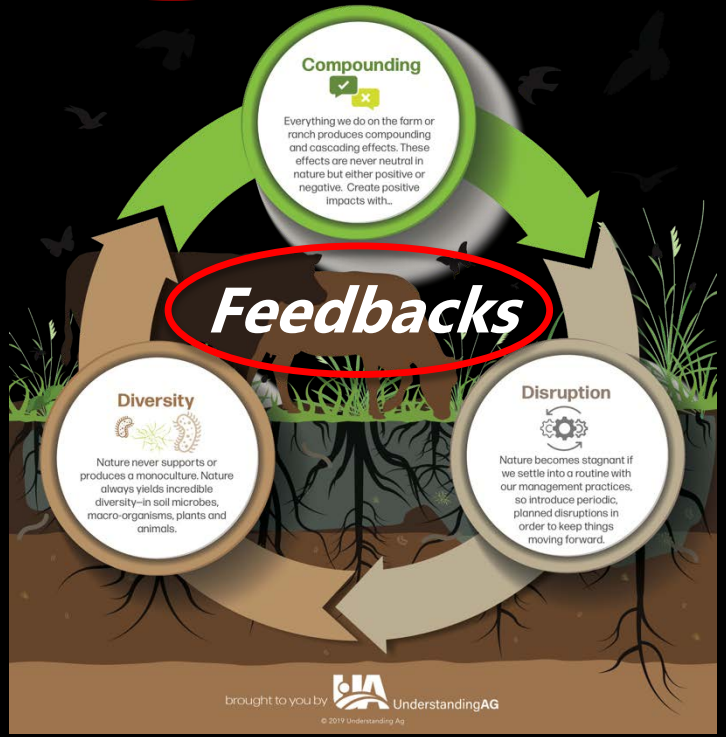
Keep living roots in the soil
as long as possible each year. Roots feed soil microorganisms, which feed our plants.

6

Grow healthy animals and soil together.
Grazing has been an essential component of all soils at one time or another.

brought to you by SOIL HEALTH ACADEMY

THREE RULES OF ADAPTIVE STEWARDSHIP



brought to you by UnderstandingAG

Placeholder Descriptions

Regenerative agriculture applies an adaptive, ecological approach to managing the agricultural landscape. It has a particular focus on the health & function of our soil, plants, animals and people with an expectation of similar or improved profitability.
Regenerative agriculture encourages a mindset of continuous improvement and accounts for every farm and farmer being different. It emphasises the connection between the health of our farms, and the health & resilience of our communities, waterways, biodiversity and climate.

– From Maury Leyland Penno, adapted by Sam Lang

Examples of regenerative farming systems in New Zealand

Arable

Arable

- **Gold** NZ Wine of the Year Awards 2019
- **Gold** NZ International Wine Show 2019
- **Silver** Marlborough Wine Show 2019
- **Silver** New Zealand Aromatic Wine Competition 2019

Viticulture

Dairy

Dairy

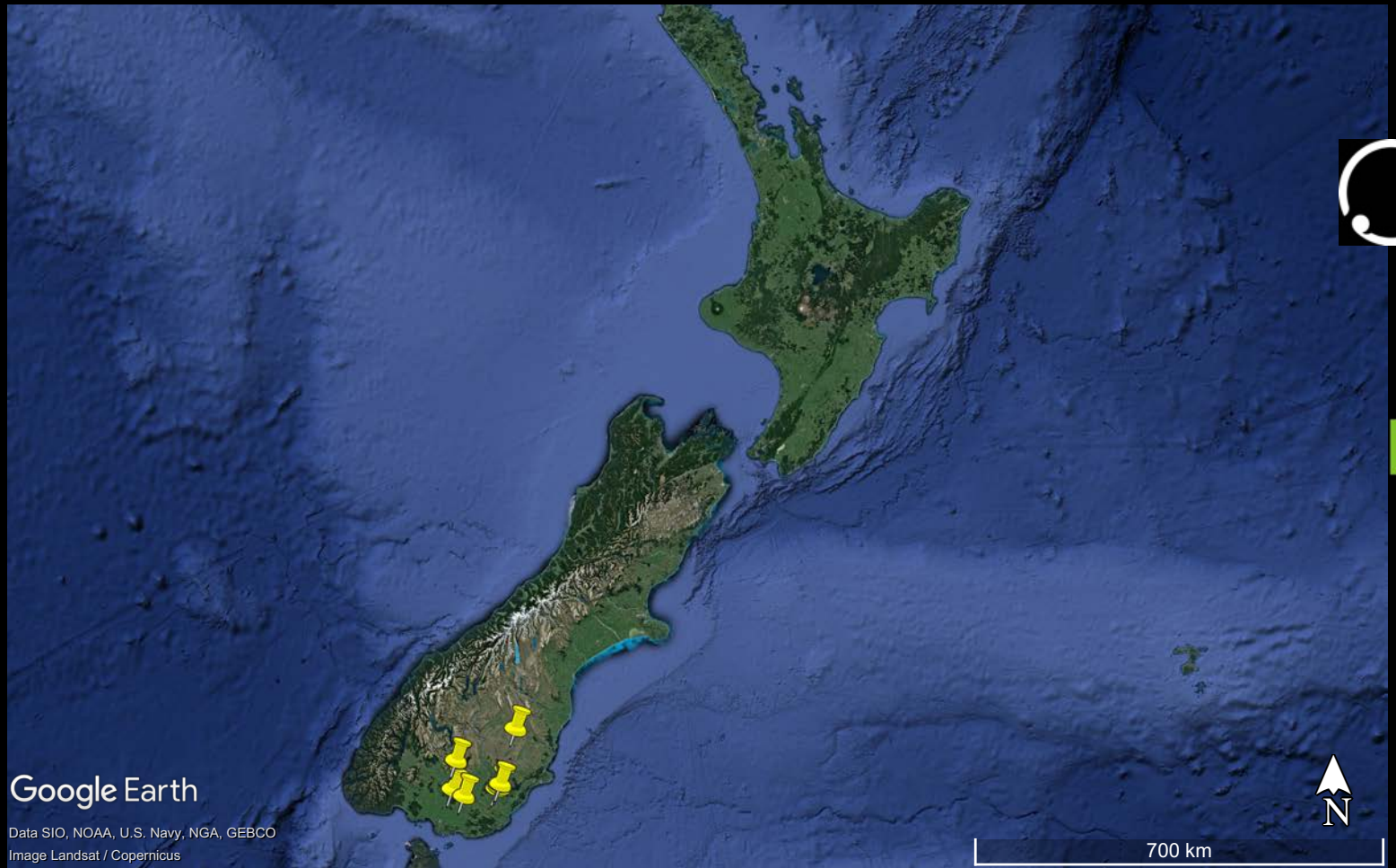
Sheep & Beef


Sheep & Beef

Building the scientific evidence in New Zealand

- **Pilot Study on pastoral farms**

Pilot Study : Dairy + Sheep & Beef

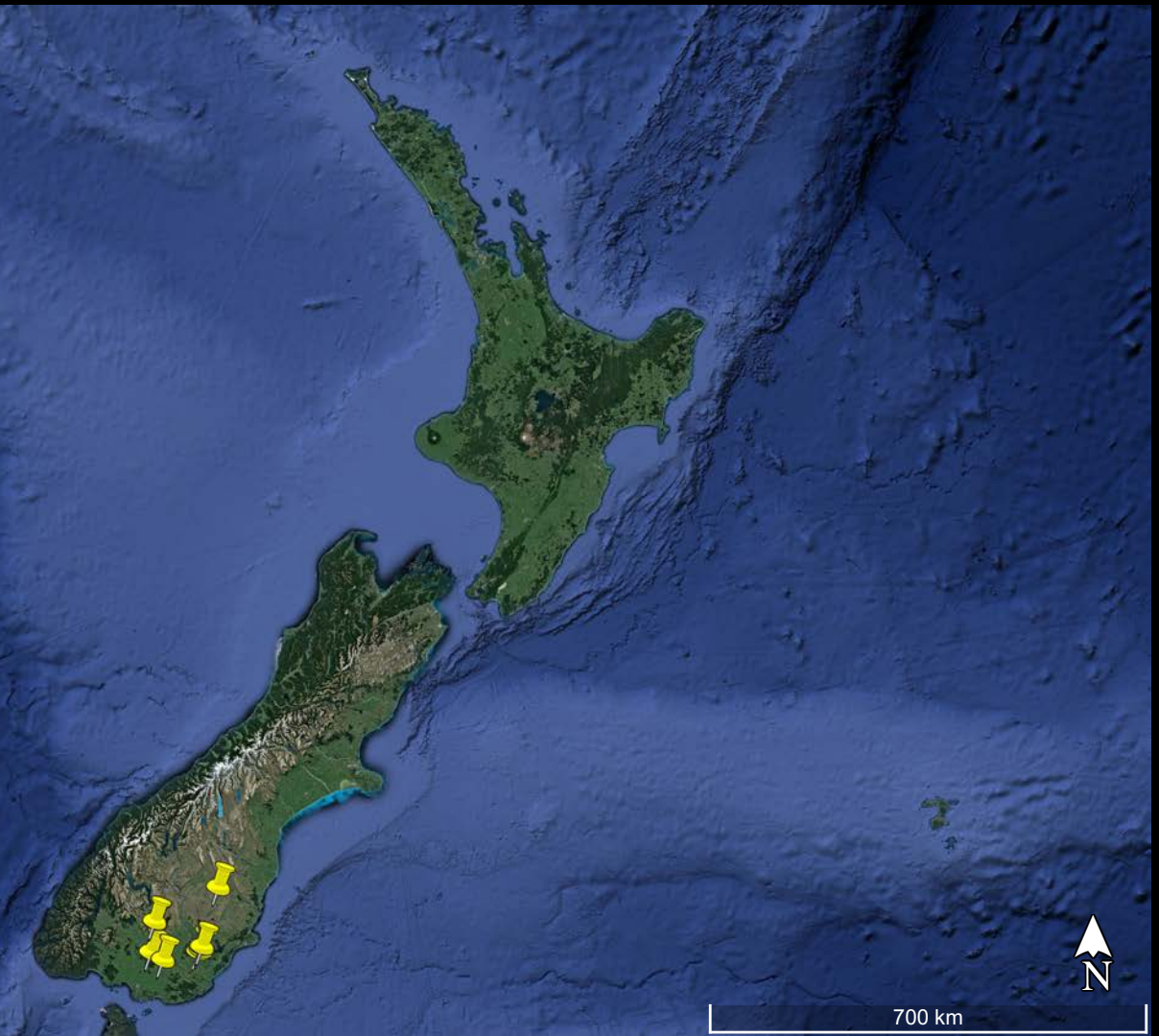


Manaaki Whenua
Landcare Research

agresearch
āta mātai, mātai whetū

Plant & Food
RESEARCH
RANGAHAU AHUMĀRA KAI

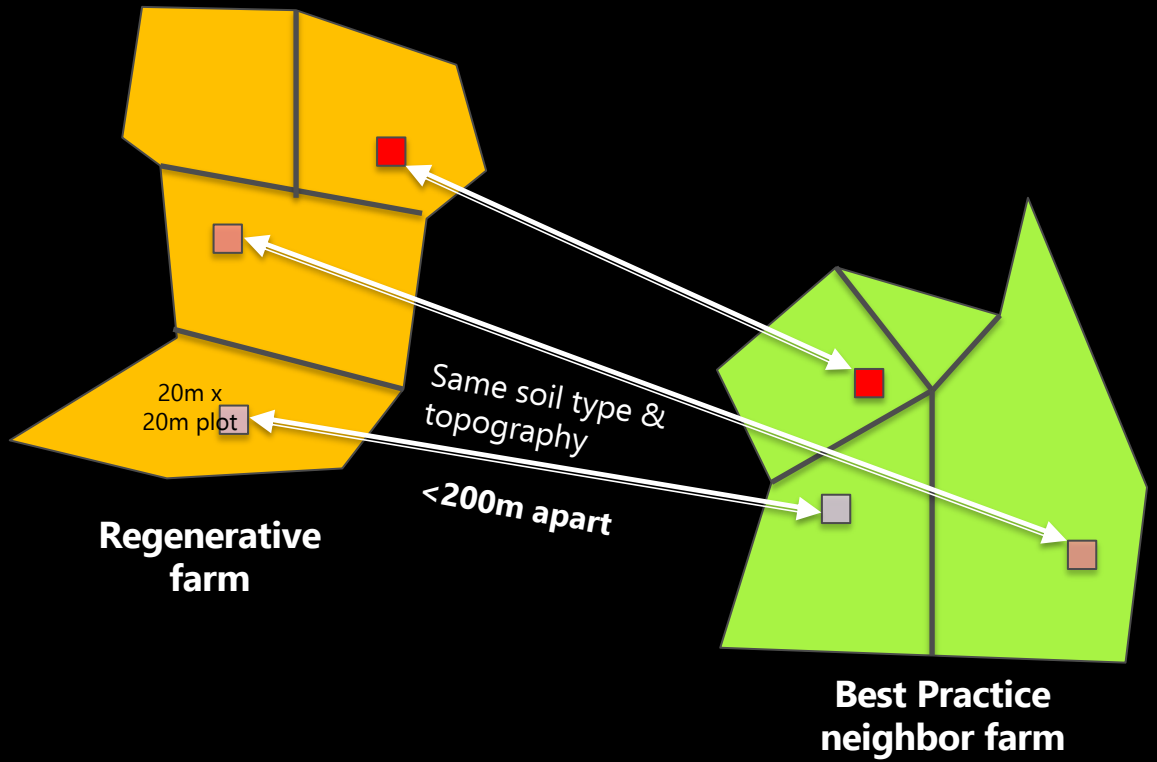
BakerAg
Inspiring Agriculture



Goals of the study

- Test indicators
- Baselines
- Test experimental design

Experimental Design

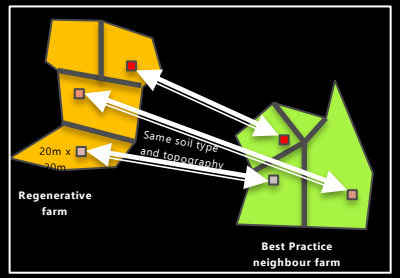


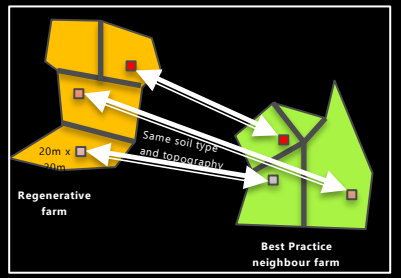
Pairwise comparison

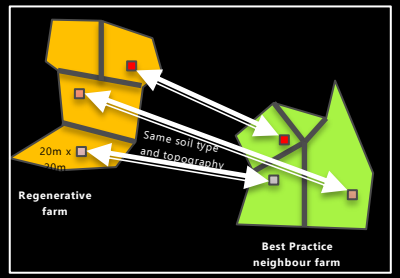
1 Pair of farms = 1 replicate

Experimental Design

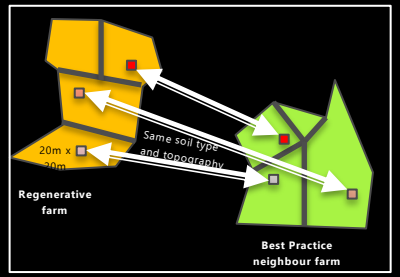
3 pairs of Sheep & Beef (dry stock) farms

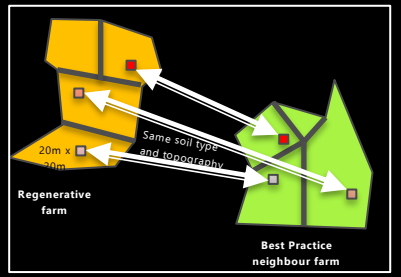


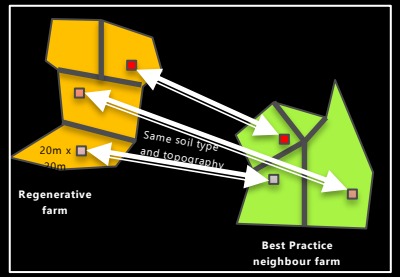




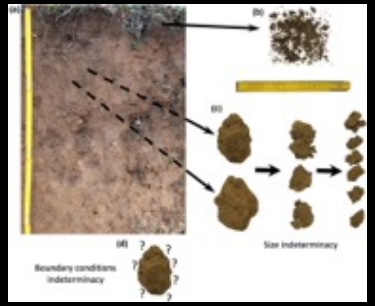
3 pairs of dairy farms





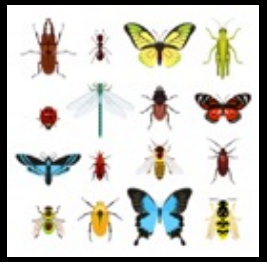


Soil C/N stock



Soil Aggregates

forage diversity & quality

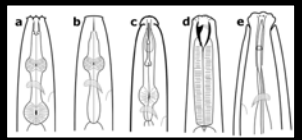


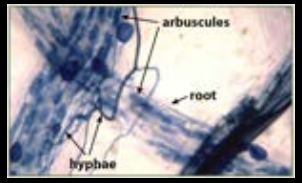
Insects

Water infiltration and Holding capacity

Soil macro & micronutrients & C pools

Visual soil health assessments





Soil biota

Soil C/N stock

Soil Aggregates

forage diversity & quality

Insects

performance

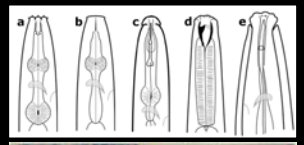
Profit $$$

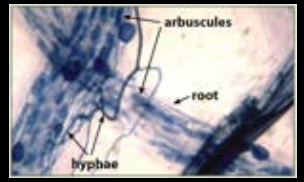
Practices

Water infiltration and Holding capacity

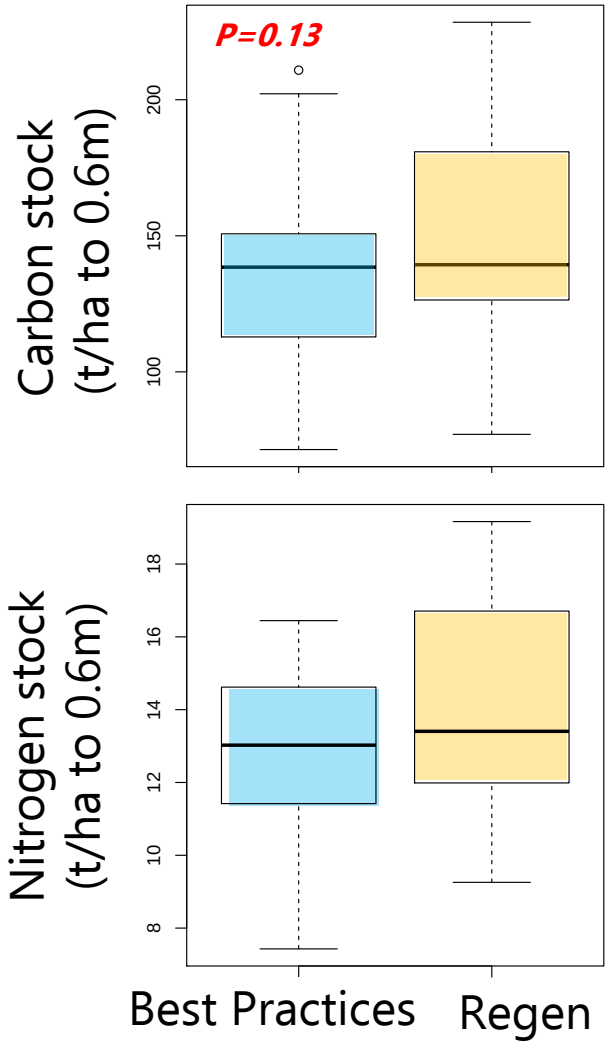
Soil macro & micronutrients & C pools

Visual soil health assessments



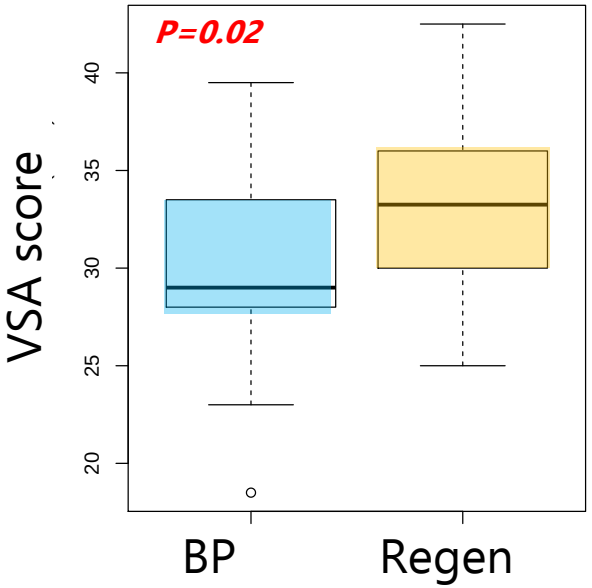


Soil biota



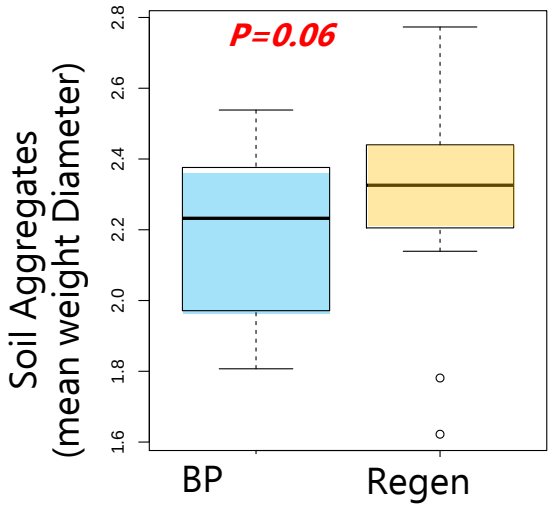
Soil Carbon & Nitrogen Stocks

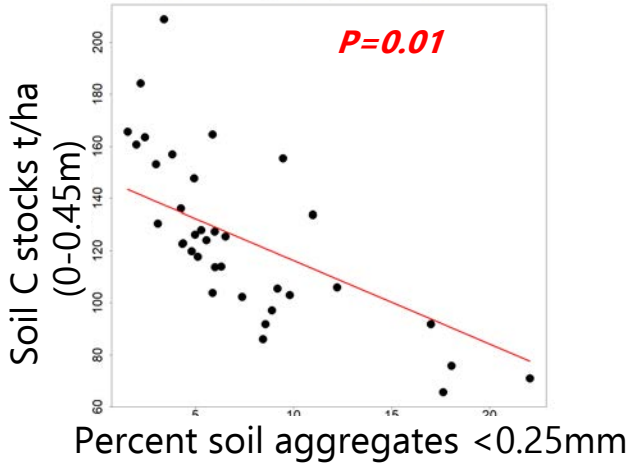
- No significant effect of management detected on soil C stocks
- No indication that soil N stocks might be decreased with reduced N input
- Number of observations was too low to detect stock differences



Visual Soil Health Assessment

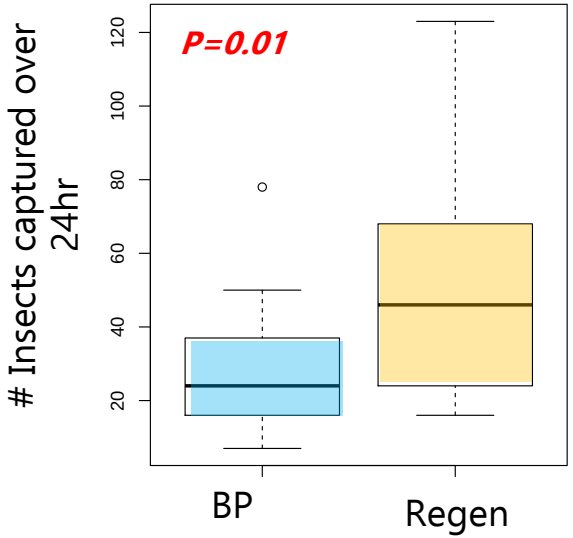
- Soil Health improved under regenerative management

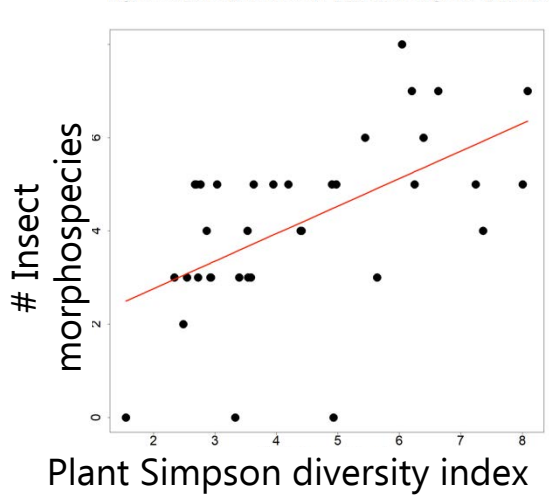




Soil structure and carbon

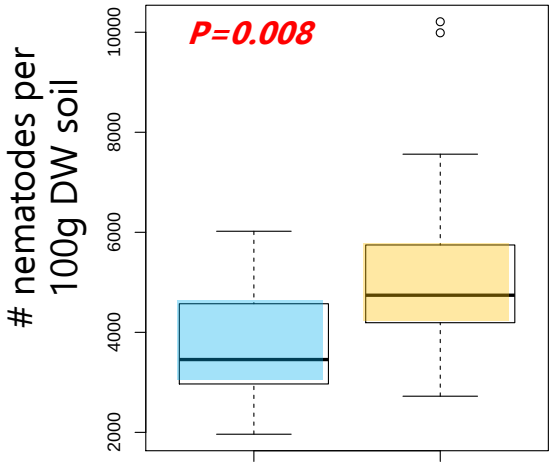
- Trend for soil structure improvement under regenerative management
- Soil structure correlates with soil C stock across all farms regardless of management

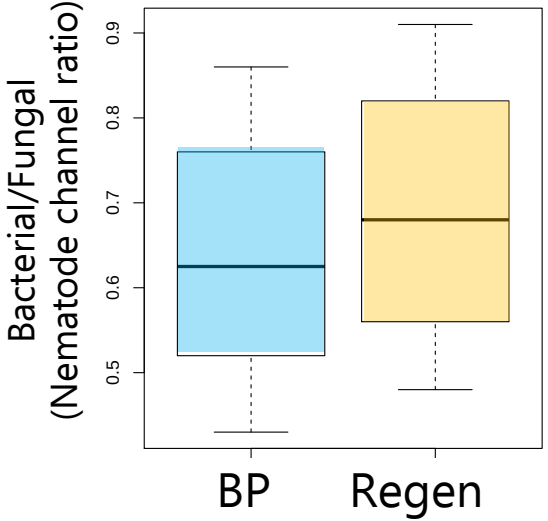


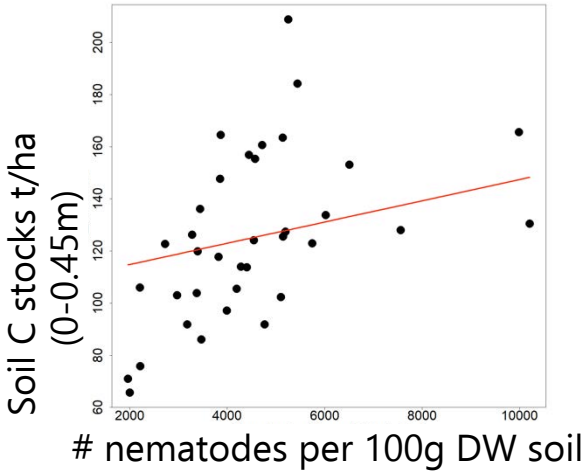


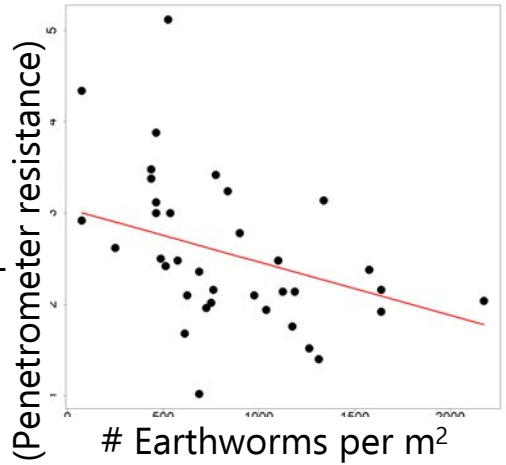
Aboveground Biodiversity

- Greater insect biodiversity under regenerative management
- Insect diversity linked to plant diversity across all farms regardless of management







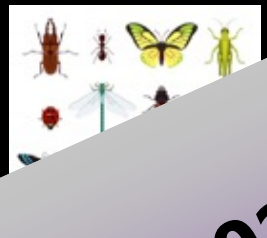


Belowground Biodiversity

- Nematodes key indicator taxa
- Belowground Biodiversity linked to key ecosystem functions

Soil C/N stock

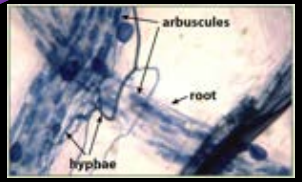
Soil Aggregates



Water infiltration and Holding capacity

Soil macro & micronutrients & C pools

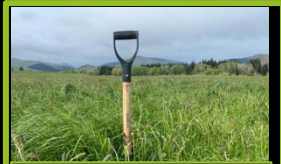
Visual soil health assessments



Soil biota

performance

Profit $$$



Practices

All Results expected December 2020

Building the scientific evidence in New Zealand

- Think Piece on Regen Ag

National Science Challenges

OUR LAND AND WATER

Toitū te Whenua, Toiora te Wai

NEXT FOUNDATION

Think Piece on Regen Ag

ES FOR CHANGE

What Do We Know About Regenerative Agriculture in New Zealand?

New Zealand is thirsty for knowledge about regenerative agriculture, and investment to grow uptake among farmers has been proposed as an economic stimulus following the Covid-19 lockdown. A new Our Land and Water project is developing a framework for building a scientific evidence base specific to regenerative agriculture in New Zealand

PHOTO: Dr Nina Koele measuring water infiltration rate (photo credit: Jason Nolan)

Posted: 27 May 2020

POST TAGS

#community, #connection,

In 2020, news headlines have been dominated by global crises – the Australian wildfires, the Covid-19 pandemic, even locusts and murder hornets.

Amid this stream of relentlessly apocalyptic news, one solution has consistently broken through to grab some headlines itself: regenerative agriculture, or 'regen ag'.

Think Piece on Regen Ag

Collaborators

- AgResearch
- Bragato Research Institute
- DairyNZ
- Lincoln University
- Manaaki Whenua Landcare Res
- NorthTech
- Otago Innovations
- Plant and Food Research
- University of Canterbury
- Toha Foundry

- Abron
- Beef + Lamb NZ
- Calm the Farm
- FAR
- Fonterra
- Integrity Soils
- nRythm

- NZ Merino
- NZX
- Pamū
- Quorum Sense
- Taiao Natural Resource Mngt
- Winegrowers NZ

+ overseas Researchers (involved in large US AMP project)

Think Piece on Regen Ag

Goals of the project

Develop a research framework that can be used to develop a scientific evidence base, and research questions, specific to Regenerative Agriculture in NZ.

To do this, we have organized the project in 4 parts:

1. Stakeholder's questions about regenerative agriculture?

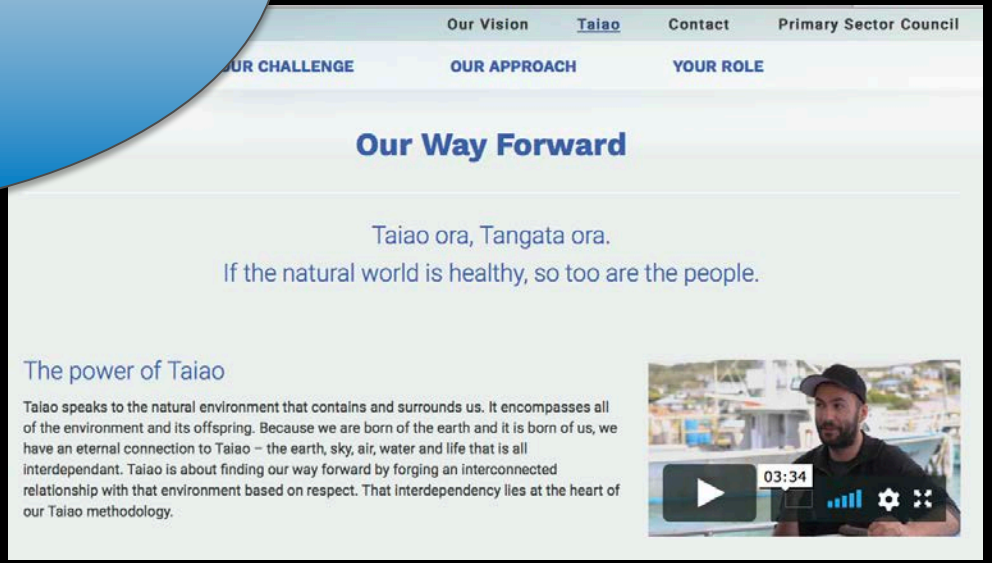
2. Top principles of regenerative farming systems in New Zealand - in general and by sector

Outcomes		Priority tier				Indicators				Benchmarking system	Further info
		dairy	S&B	Arable	Viticulture	cheap&scalable	Accurate	Observational	R&D		
Land Quality	Soil C stock	1	1	1	1	n/a	Whole Farm	VSA C score	Lidar / NIR	in progress	page 3
	Erosion	1	1	2	2						
	Fertility										
	Soil health										
	Biodiversity										
Water Quality	[Nitrate]										
	Sediment load										
	Biodiversity										
Climate Change & Adaptation	Drought resilience										
	Methane emission										
	Pest invasion										
Food Quality & Safety	"nutrient density"										
	Agchem residuals										
	Taste										
Animal Welfare	Quality of life										
	Reproduction										
	Choice of food										
Profitability	Days holidays off-farm										
	Hourly rate										
	Holidays										
Productivity	Production per ha										
	Business resilience										
Social wellbeing	Mindset (possiblity/problem)										
	Role in community										

3. framework for quantifying outcomes from regenerative farming activities

4. Linkages with Iwi-led & Kaupapa Maori initiative

Te Waka KAI ORA



Team work

Manaaki Whenua
Landcare Research

Kate Orwin, Paul Mudge, Nina Koele, Norman Mason, Kara Allen, Rowan Buxton, Chris Morse, Clara Olhaitz, René Deverish, Mike Beare, Robyn White, Simon Fowler, Chris Garland, Emily House

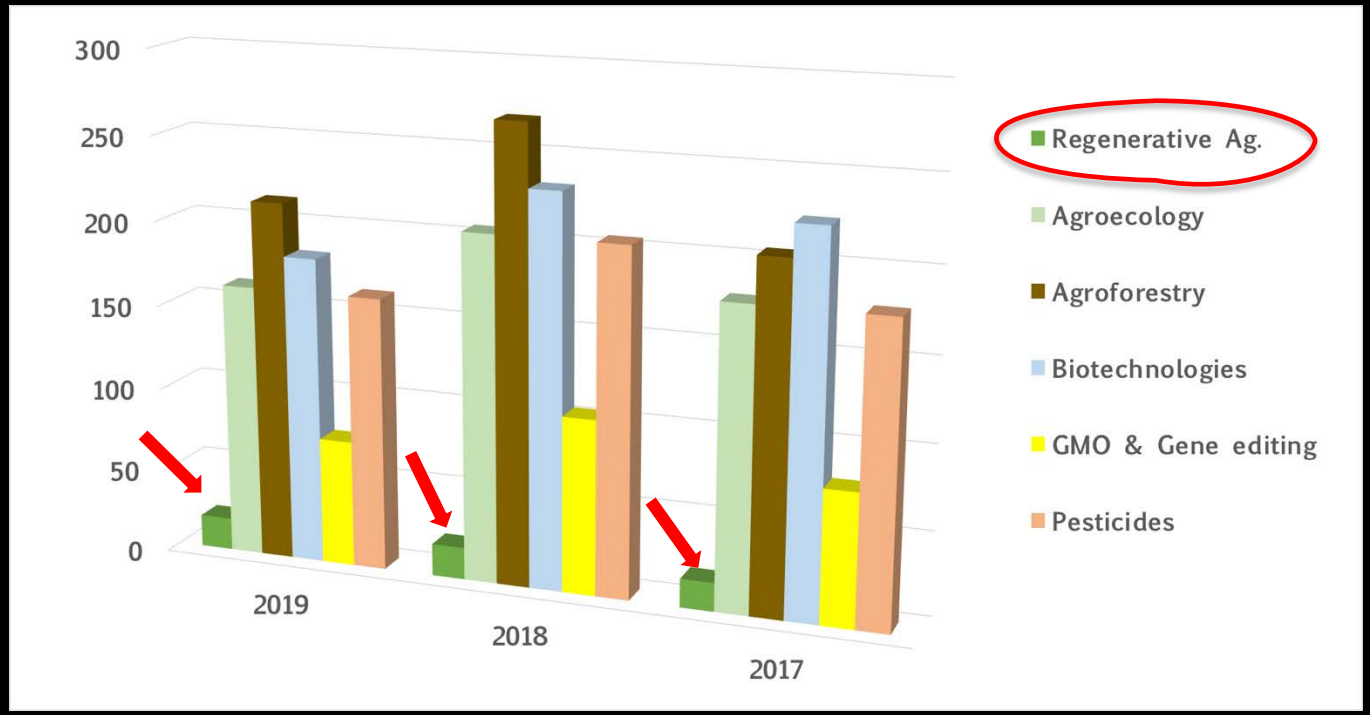
Quorum Sense team
MWLR

Where to from here?

SCIENCE

On-the-ground

Peer-reviewed articles mentioning Regen Ag



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