

Recent policy developments and practical responses to lessen the impacts of grazing livestock on water quality in NZ

agresearch
āta mātai, mātai whetū

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AgResearch Invermay, Mosgiel

Outline

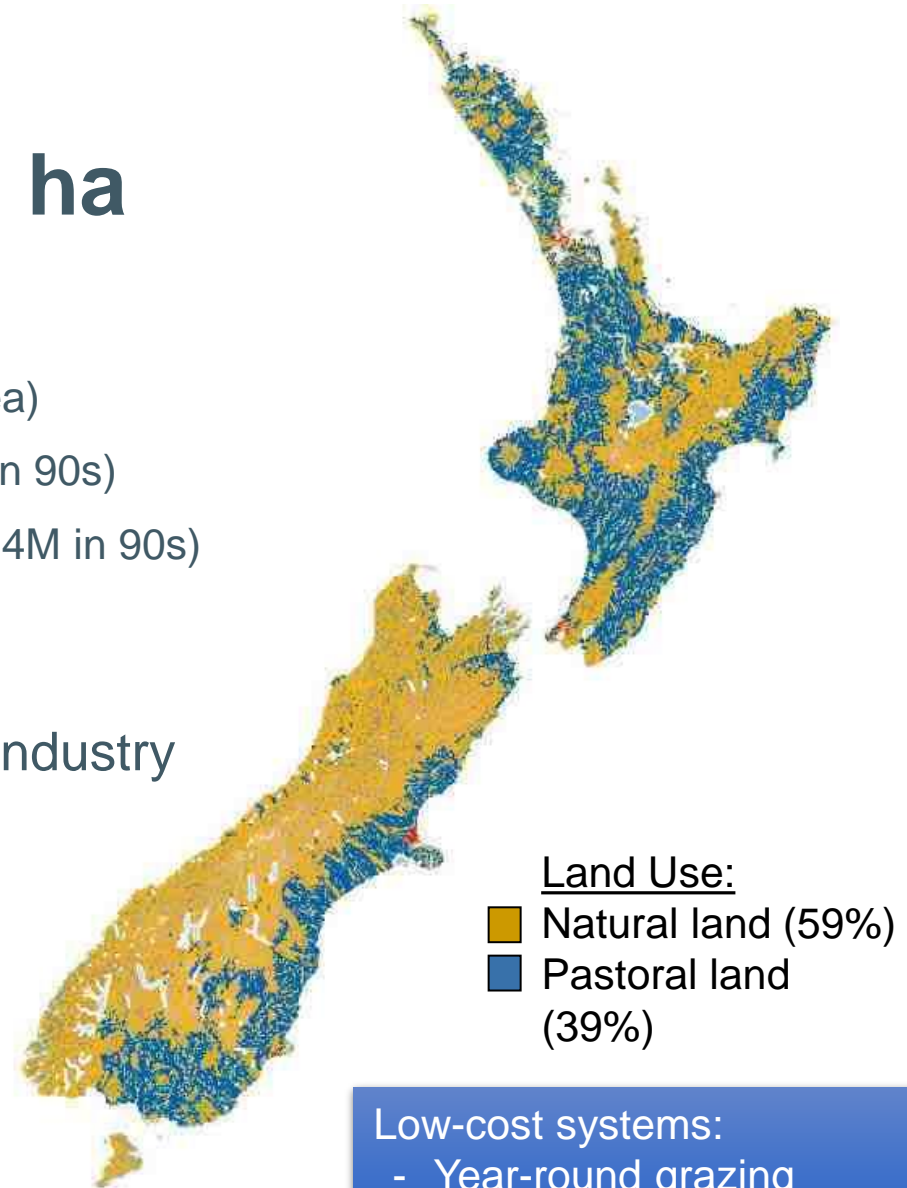
1. Issues and challenges
2. Policy developments
3. Practical responses
4. Research needs

New Zealand – 27 M ha

Populations:

- 5 million people (on 1% of land area)
- 27 million sheep (down from 60M in 90s)
- 6.5 million dairy cattle (up from 3.4M in 90s)
- 4 million beef cattle

Agriculture is most important NZ industry
Predominantly pastoral livestock

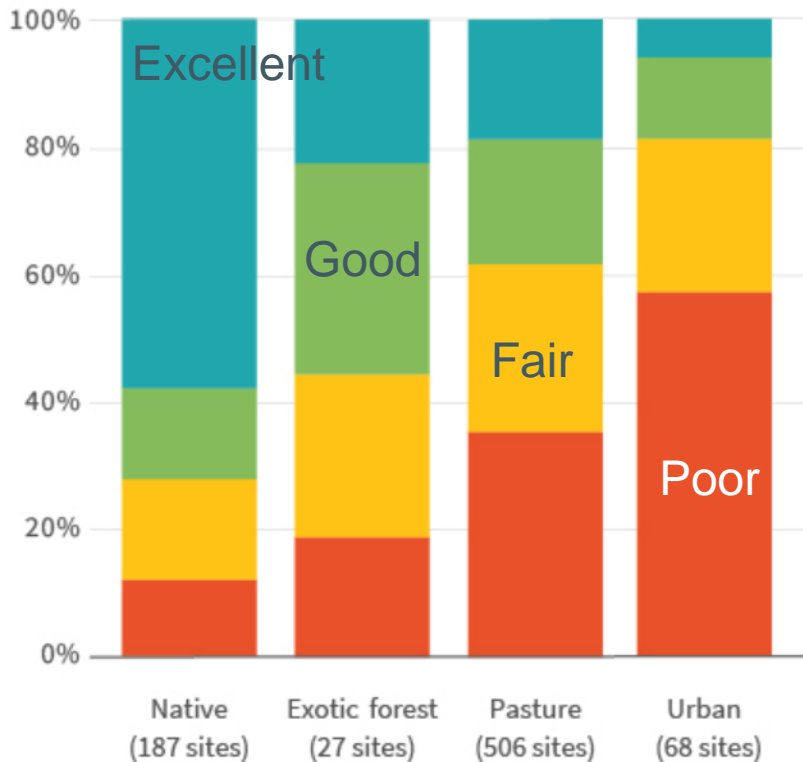


Low-cost systems:

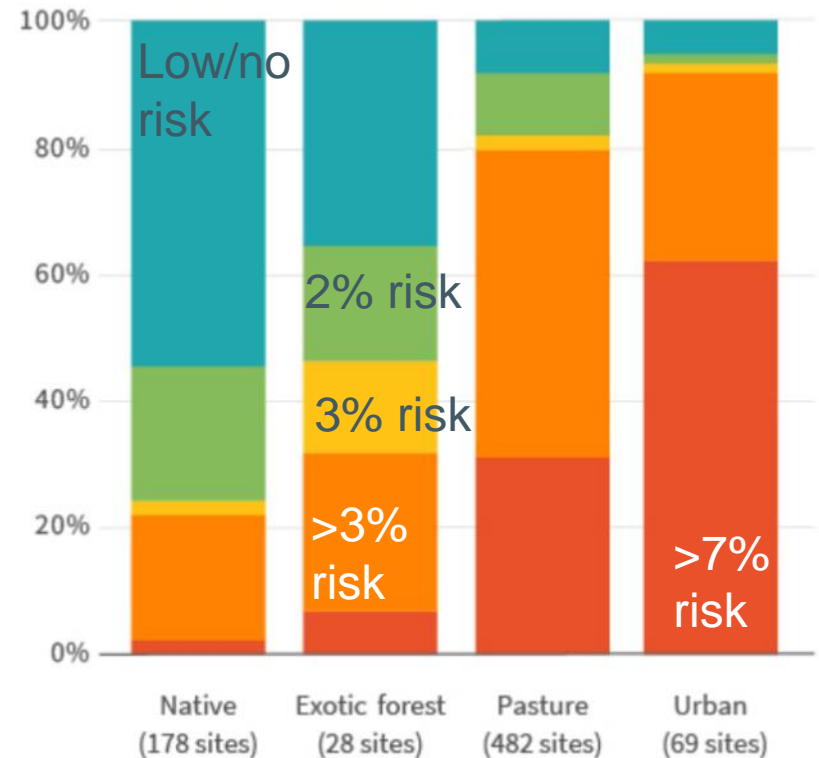
- Year-round grazing
- Clover-based pastures

Water quality state National snapshot

Macroinvertebrate Community Index

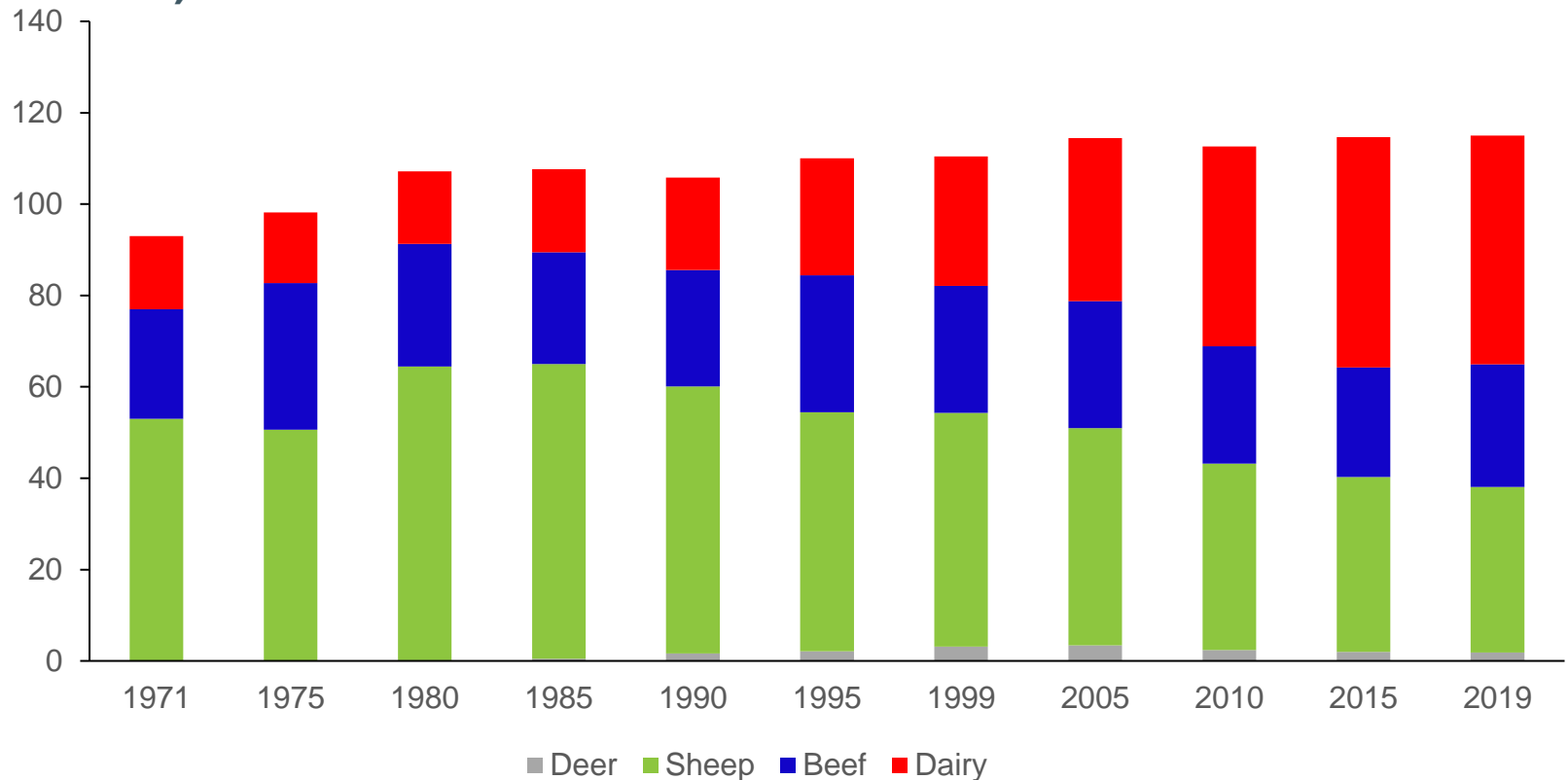


E. coli



Animal stock unit equivalents (SUEs) 1971 – 2019

(millions)

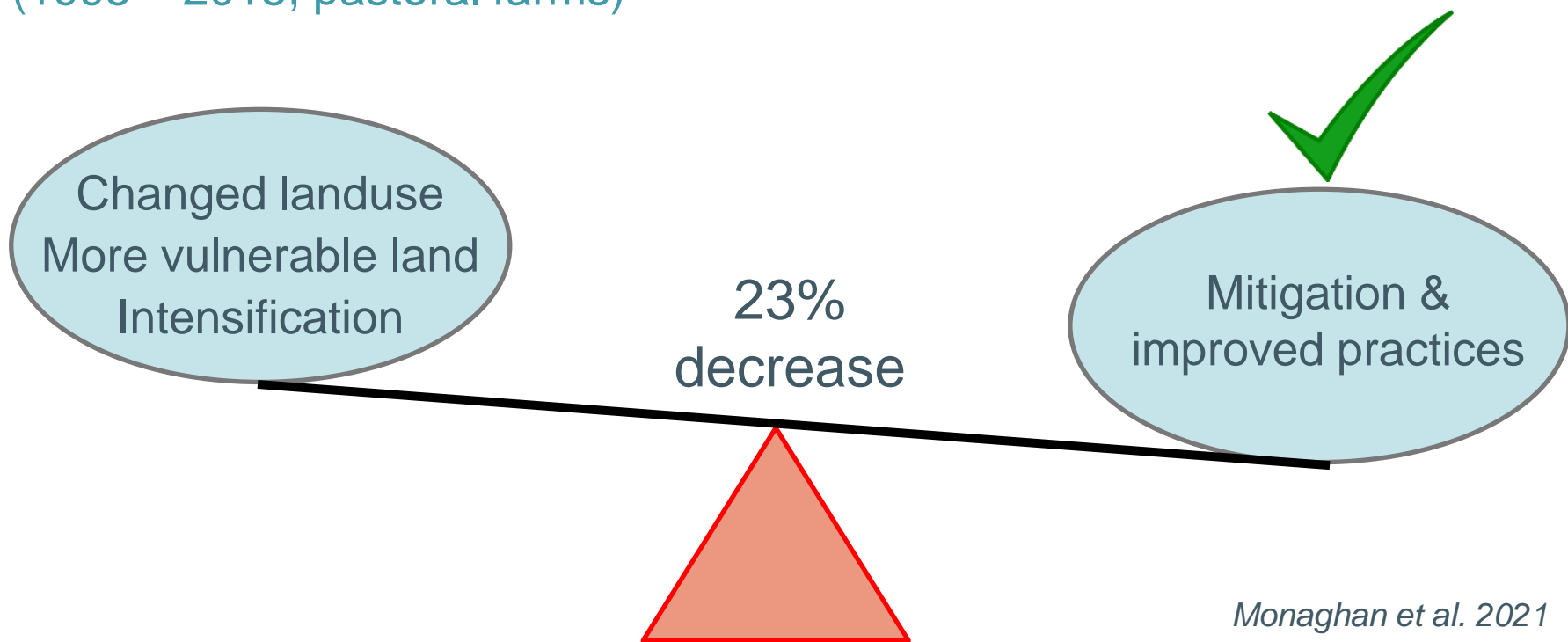


Source (head counts): StatisticsNZ, www.stats.govt.nz
1 SUE consuming ~ 6000 MJ ME per year

Implications for water quality

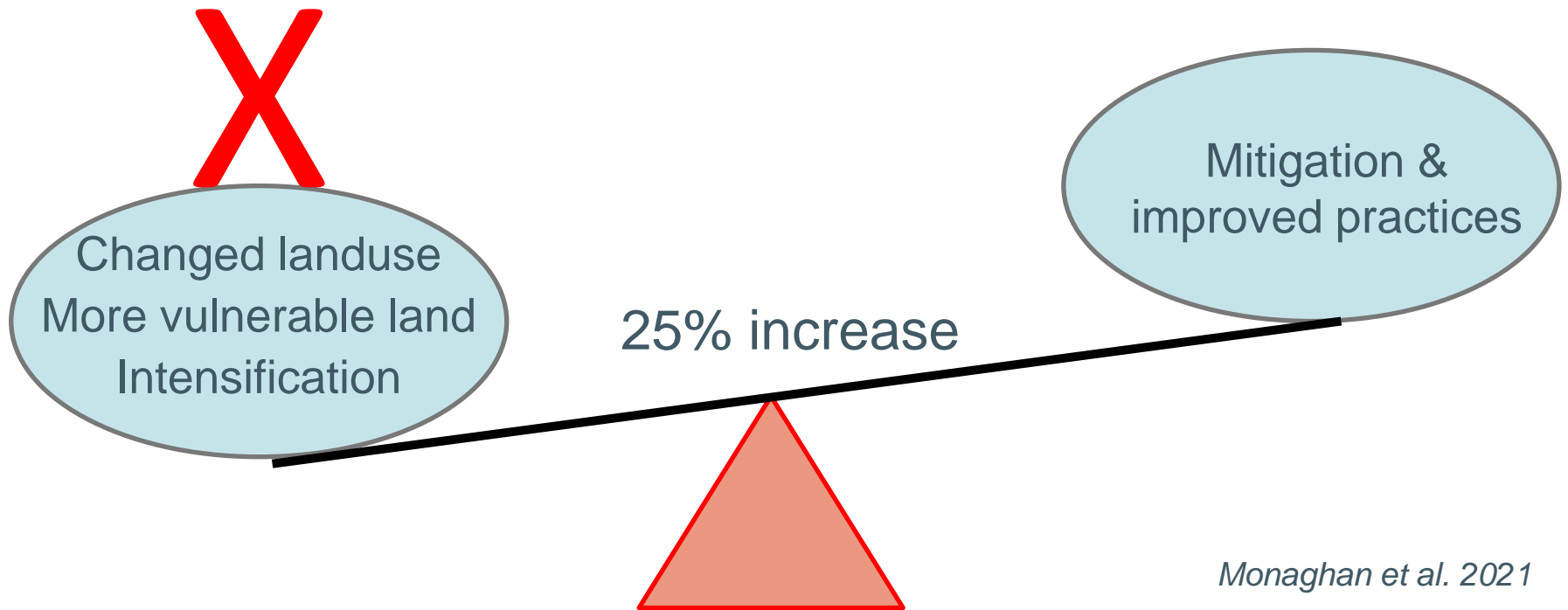
Assessments of farm scale P losses

(1995 – 2015, pastoral farms)



Implications for water quality

Assessments of farm scale N losses (1995 – 2015, pastoral farms)



Monaghan et al. 2021

2. Policy developments

National Policy Statement for fresh water management

Directing **regional** councils to set limits for fresh water in their regional plans to

- “**..safeguard fresh water**’s life supporting capacity, ecosystem processes, and indigenous species
- manage freshwater bodies so **people’s health** is safeguarded
- maintain or **improve the overall quality** of fresh water within a region..”

The Zero Carbon Bill

New Zealand is on the path to a low emission, climate resilient future; the Government aims to reduce our emissions to net zero by 2050.

- The Government is committed to New Zealand becoming a world leader in climate change action
- It plans to introduce a new Zero Carbon Bill that will set a new emissions reduction target by 2050
- It also plans to establish an independent Climate Change Commission.

Tuesday, 23 October 2018 10:12

Farmers under the microscope

Written by Peter Burke

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Farming has been under the microscope this month with three heavyweight Government reports — on water quality, climate change and *Mycoplasma bovis* — all appearing in just three days.

Federated Farmers vice-president Andrew Hoggard quipped that his response to these challenges was to



id Parker.



Essential Freshwater

Healthy Water, Fairly Allocated

Interim Climate Change Committee Announced

Tuesday, 17 April 2018, 2:14 pm

Press Release: [New Zealand Government](#)

Hon JAMES SHAW
Minister for Climate Change

The government announces \$118 million grant to help plant one billion trees by 2028

30/11/2018 Holly Carran

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Shane Jones

Forestry Minister

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What does this (likely) mean?

- Farm Plans mandatory (starting with “at risk” catchments)
- No more than 190 kg synthetic N/ha per year
- Interim controls on intensification
- Stock exclusion from waterways & wetlands
- More stringent rules for animal wintering – limits on areal extent, slope, pugging depth, re-grassing dates
- Tighter controls on stock holding areas (feed, standoff and loafing pads; wintering structures)
- For many farms: managing in-stream nutrient concentrations (perhaps to < 2.4 mg DIN/L)

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INDEPENDENT VOICE OF THE SOUTH

WEEKEND

Otago Daily Times

SATURDAY & SUNDAY, July 17-18, 2021

INSIDE YOUR WEEKEND mix

AT HOME ON THE RANGE

BUGS AND LEBRON

BUSINESS • 16
Exciting challenges in the South

REGIONS • 17
Landfill gets consent

SPORT • 32

Last chance to impress

'Enough is enough'

STAFF REPORTERS

THE country came to town and boy did the town know about it. Huge crowds swarmed into towns and cities across the South yesterday, united in their support of rural New Zealand.

From Oamaru to Invercargill, convoys of tractors, farm vehicles, trucks and even joined thousands further north taking part in the Huel of a Protest event, organised by Groundswell New Zealand, protesting against what the rural sector says are unsustainable government regulations.

In Dunedin, the first tractor, driven by Jamie Marshall, rolled into the Octagon just after noon, to much cheering from the large handheld city crowd, and the last vehicle went through about 2.30pm.

Mr Marshall, husband of the protest's Dunedin organiser Gill Marshall, was thrilled to see the large turnout in support of the protest. People were starting to realise that, without farmers, they would be "pretty hungry", he said.

Mrs Marshall estimated at least 700 tractors and utes had taken part in Dunedin, possibly up to 1000.

Jim Macdonald, who drove his tractor in from his Clarks Junction farm, said the huge turnout was what he had hoped for but did not expect.

He praised Groundswell NZ co-founders Laurie Paterson and Bryce McKenzie for doing a "marvellous job".

Local estate agent Peter Wilson said he turned up to support farmers who were "just getting the raw end of the deal". "There were new rules all the time and businesses were also affected."

"Everyone's getting so many rules, you can't keep up." Despite the many concerns, nobody was listening and it was like the Government had "earmuffs" on, he said.



Making their feelings known... More than 1000 people listen to speeches during the protest gathering at the Gore A&P Showgrounds yesterday.

Groundswell's concerns

- ▶ Unsustainable freshwater regulations.
- ▶ Proposed Significant Natural Areas policy penalising conservation-minded landowners.
- ▶ Over-the-top, one-size-fits-all state control.
- ▶ No respect for people, their privacy and property information.
- ▶ Decrease companies buying up New Zealand farmland to other entities.
- ▶ Taxes on essential work vehicles.
- ▶ Out-of-control costs crippling small business.
- ▶ Unprecedented mental strain on people.

Not your usual... A convoy of tractors heads along Princes St in Dunedin yesterday as part of Groundswell NZ's Huel of a Protest event. PHOTO: STEPHEN JAGRIERTY

age outlining the group's concerns and giving the Government a month to address them, or it would take further action. Groundswell had "put a stake in the ground and said enough is enough". They said the support the movement had received across New Zealand was "humbling" and was "quite amazing". Elsewhere, a parade of more than 200 tractors and utes took more than two hours to get through Balclutha, while in through a gathering of more than 1000 people and vehicles

Standing tall to support grandad



Dressed in her pink gumboots and overalls, 6-year-old Ari Wallace — one of the youngest participants in the Groundswell NZ protest — was waving a sign in support of third-generation Taleri farmer Peter Cashmore.

"I love Poppas too," Ari commented a passer-by as Ari and her twin brother Luke patiently awaited the arrival of their grandfather in Dunedin's Octagon. Luke was holding a banner reading "Give Farmers A Go".

The twins' grandmother, Mariee Cashmore, said her husband was taking part in the protest because he needed to look after their dairy farm.

The more restrictions put in front of them, the less they were able to produce, she said.

Mr Cashmore hoped his grandchildren, including another set of twins, would have the opportunity to continue the farming tradition if they wanted.

REPORT: SALLY FAZL PHOTO: CHRISTINE O'CONNOR

as about a dozen led the protest through the town's centre. Invercargill organiser Bruce Robertson estimated at least 500 people attended there, and 140 tractors, 55 tractors, five helicopters and one fixed-wing plane turned out in Te Anau.

[Continued Page 3]

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VIDEOS: www.odt.co.nz/tv

3. Practical responses

a. Better pastures/management

- Reductions in purchased N
- Diverse pastures
 - Plantain
 - More winter active
 - Deeper rooting?

Plantain

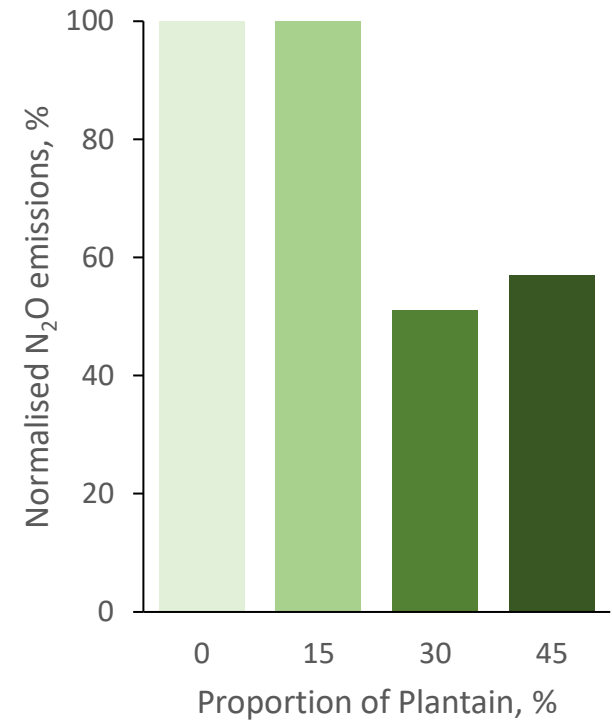
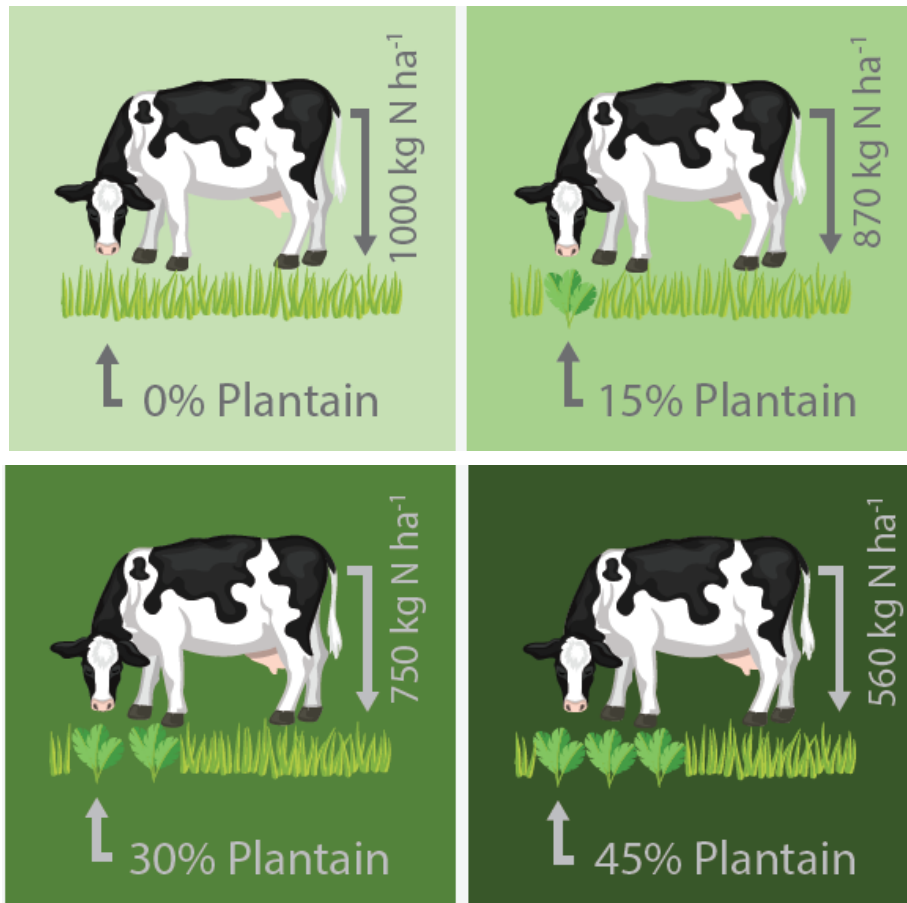
From weed to wonder plant?

- Commercially available
- Positive attributes
 - Less and diluted urine N
 - Slows nitrification
- Targeted at N leaching reduction
 - c. 10 – 30% reductions?
- ~ 30% plantain in pasture/diets will be required



Woods et al. 2018
Carlton et al 2019
Minnee et al. 2020

Plantain co-benefit: Reducing N₂O emissions



Simon et al. 2019

3. Practical responses

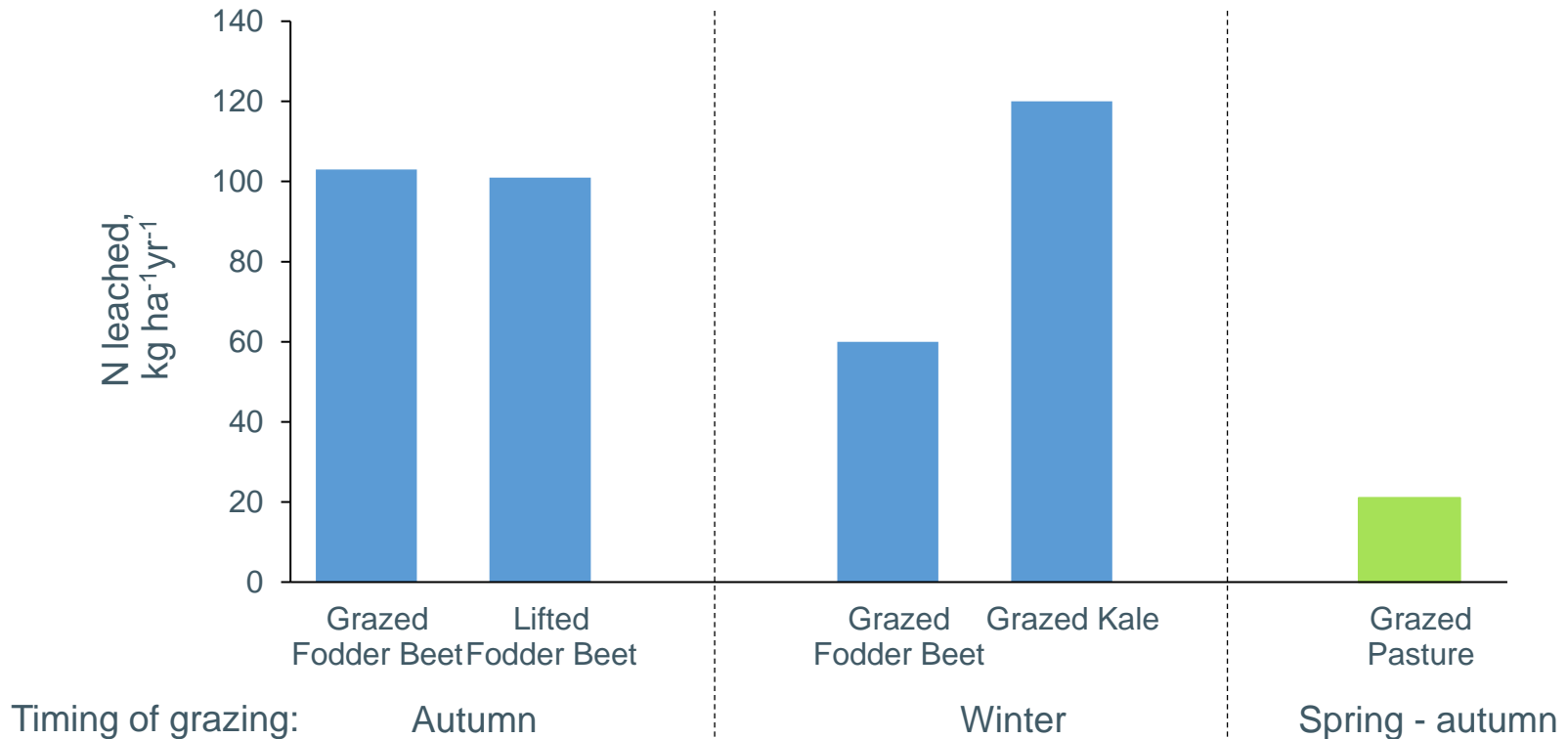
b. Forage cropping systems

- Less autumn & winter forage crop grazing



N losses to water

Crops v pasture – southern NZ



3. Practical responses

b. Improved forage cropping systems

- Less autumn & winter forage crop grazing
- Less bare or damaged soil
 - Catch crops following winter crops
 - Reduced tillage intensity



B Malcolm, P Carey and others

3. Practical responses

b. Improved forage cropping systems

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 - Provision of ground cover



3. Practical responses

b. Improved forage cropping systems

- Less autumn & winter forage crop grazing
- Less bare or damaged soil
 - Catch crops following winter crops
 - Reduced tillage intensity
 - Provision of ground cover
- Off-paddock infrastructure?



3. Practical responses

c. Alternative land uses?

- Trees...
- Fruit crops – avocado, kiwifruit, etc.
- Specialty seeds – carrot, radish, etc.
- Hemp
- Small ruminant milking

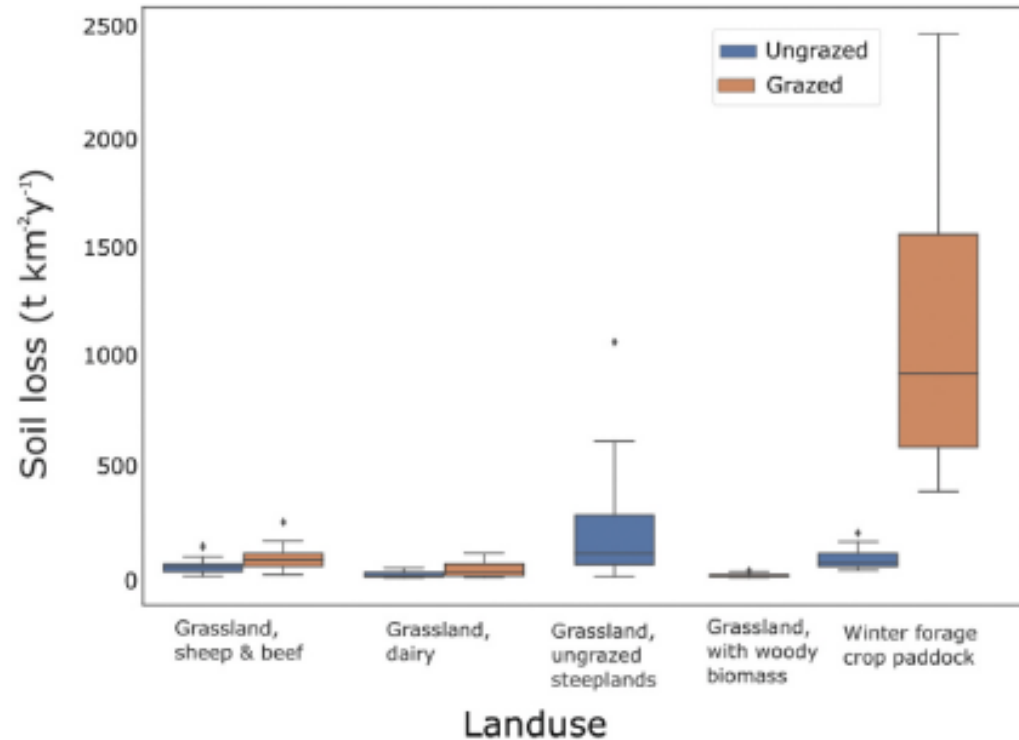
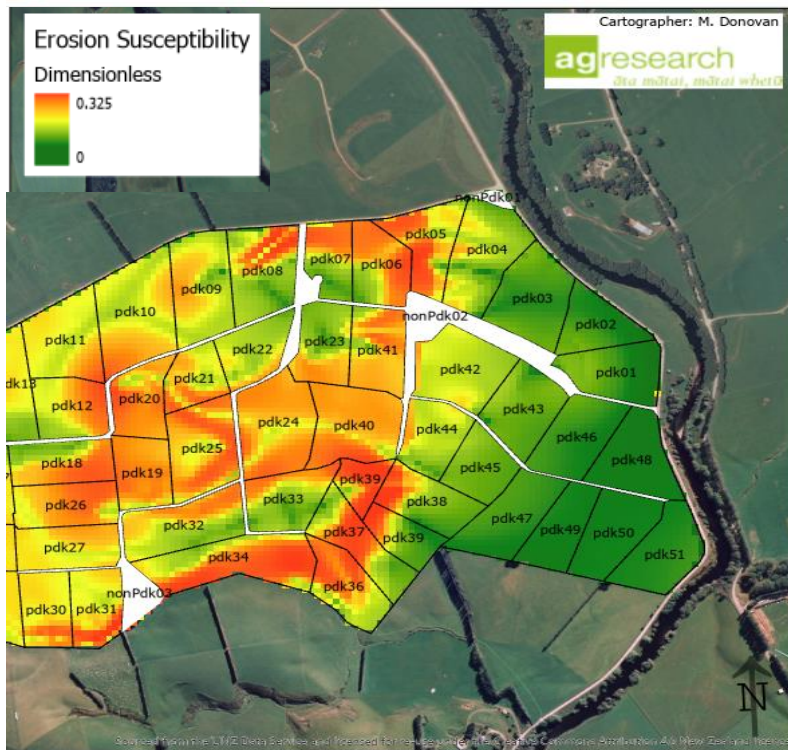
Emerging industries



3. Practical responses

d. Managing vulnerable landscapes

Minimize overlap between intensive grazing and vulnerable land
Important for sediment control at farm and catchment scale



Managing and modelling soil loss risk

Inherent properties	Management factors
Rainfall erosivity	Crop yield
Slope angle	Stock Type
Slope length	Tillage method
Soil erodibility	Grazing history
	Grazing density
	Residual Cover



Contents lists available at ScienceDirect

Journal of Environmental Management

journal homepage: <http://www.elsevier.com/locate/jenvman>



Research article

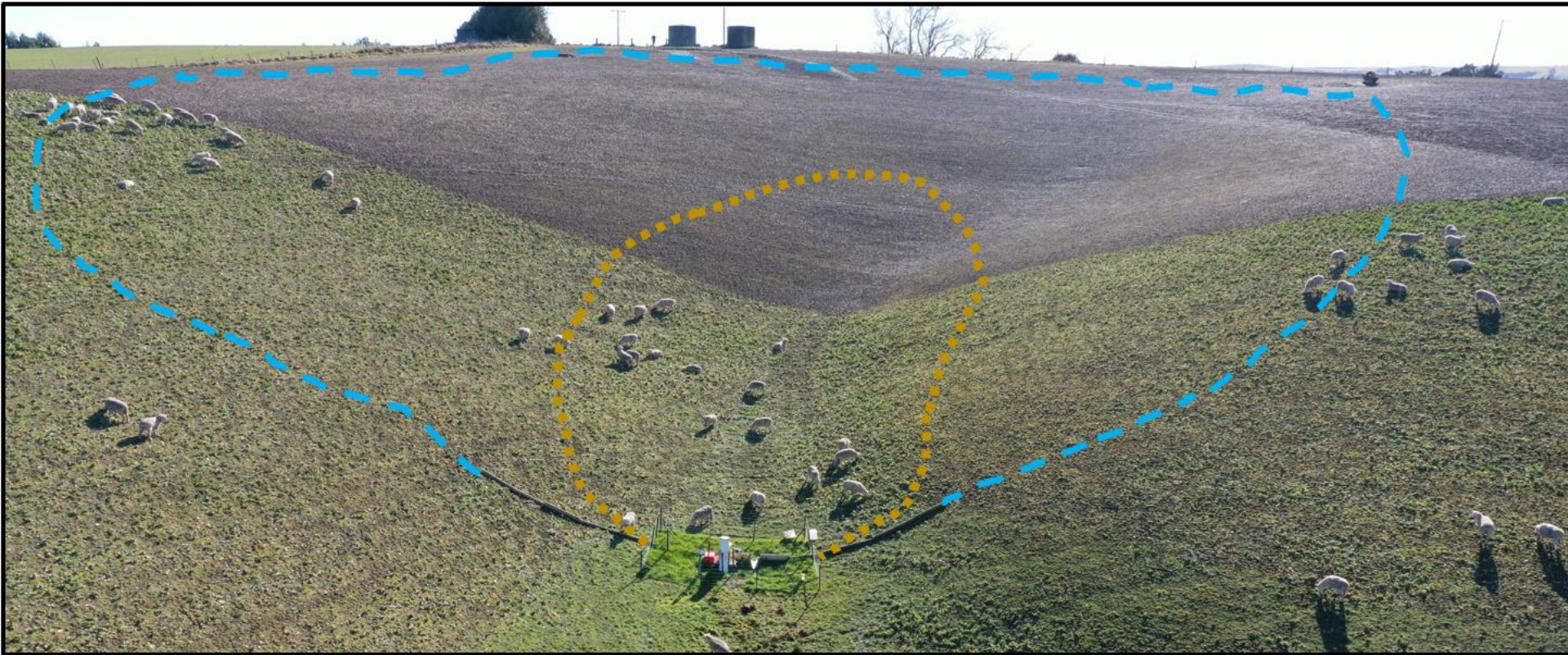
Impacts of grazing on ground cover, soil physical properties and soil loss via surface erosion: A novel geospatial modelling approach

Mitchell Donovan^{*}, Ross Monaghan

AgResearch Limited Invermay Agricultural Centre Puddle Alley, Private Bag 50014, Mosgiel, 9053, New Zealand



Tactical grazing to protect Critical Source Areas (CSAs)



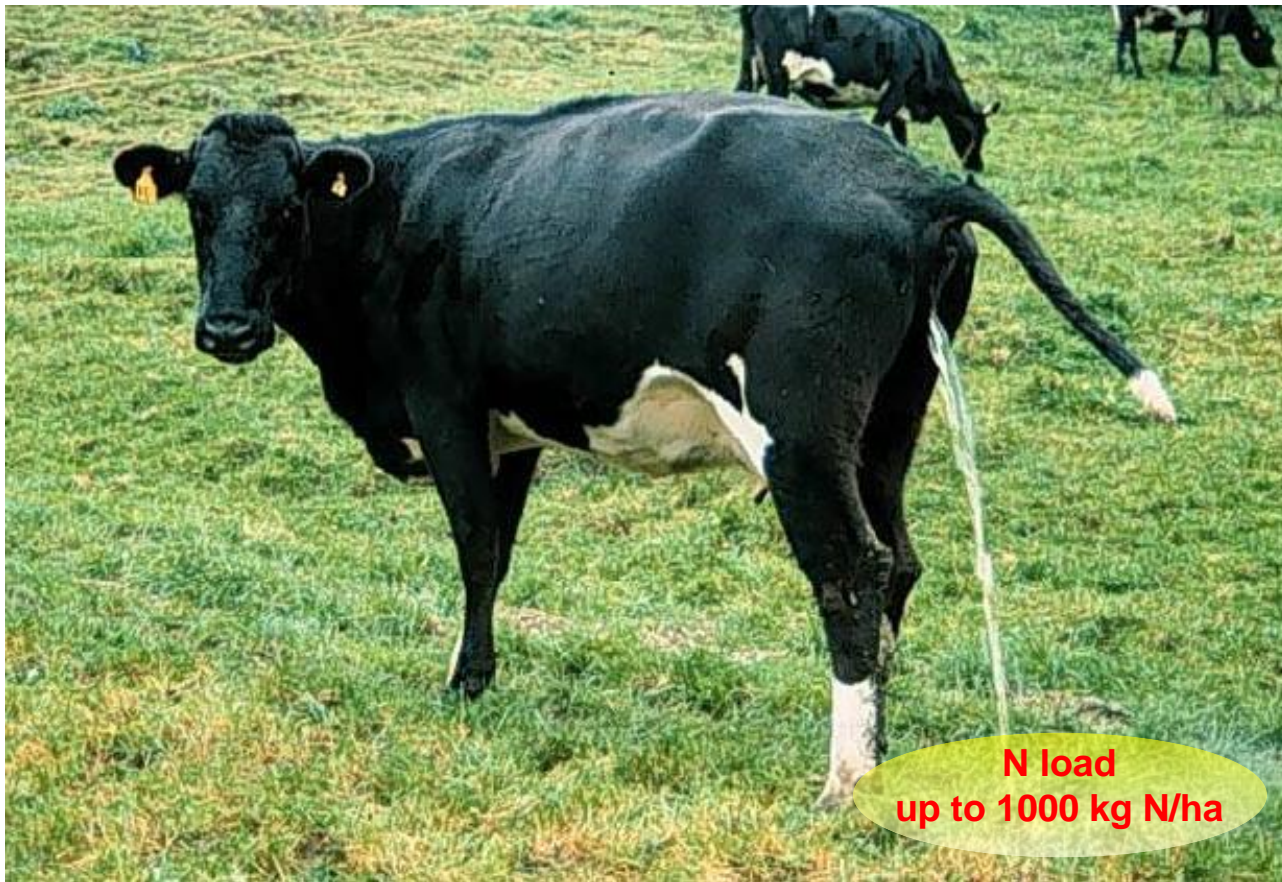
Tactical grazing to protect Critical Source Areas (CSAs)



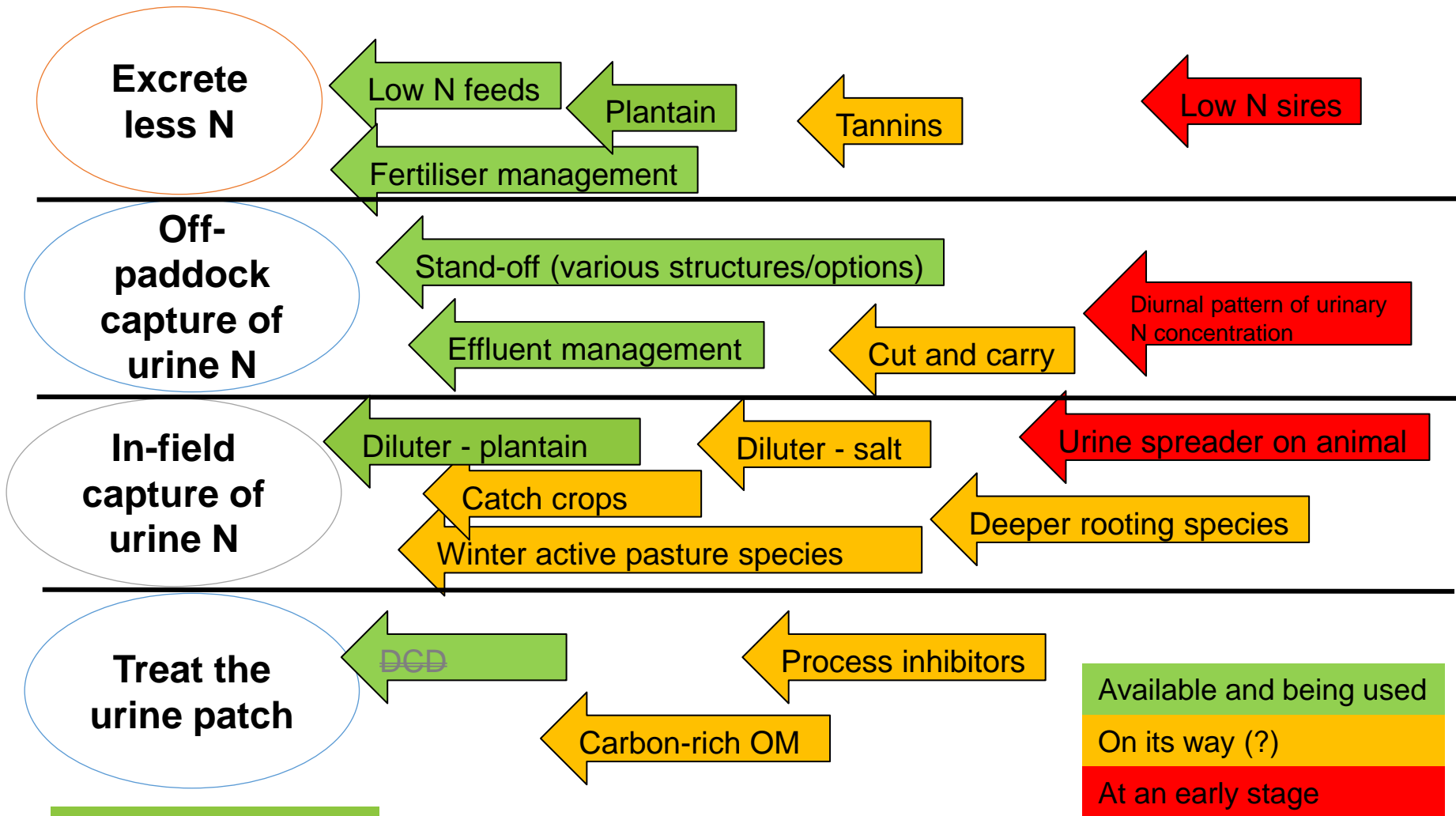
4. Research needs

- Plantain
 - Catch crops
- } effectiveness at farm scale, other attributes?
- Improved geospatial modelling to guide policy & practise
 - More efficient recycling of urinary N

Reducing the N problem = targeting the urine patch



Pipeline: some options for urinary N



More affordable standoff options?



Final remarks

- It's a tough time to be a NZ farmer...
- Implementing what we know now will be important
- Some design inefficiencies still to be overcome
 - N surplus in urine patch
 - grazed winter forage crop systems
 - transport of faecal microbes in surface runoff
- Better matching of Land Use to Land Suitability is also required