

# From weed to wonder-plant? The plantain journey

David Chapman, DairyNZ, Lincoln

On behalf of SFFF Plantain Potency programme funders and team

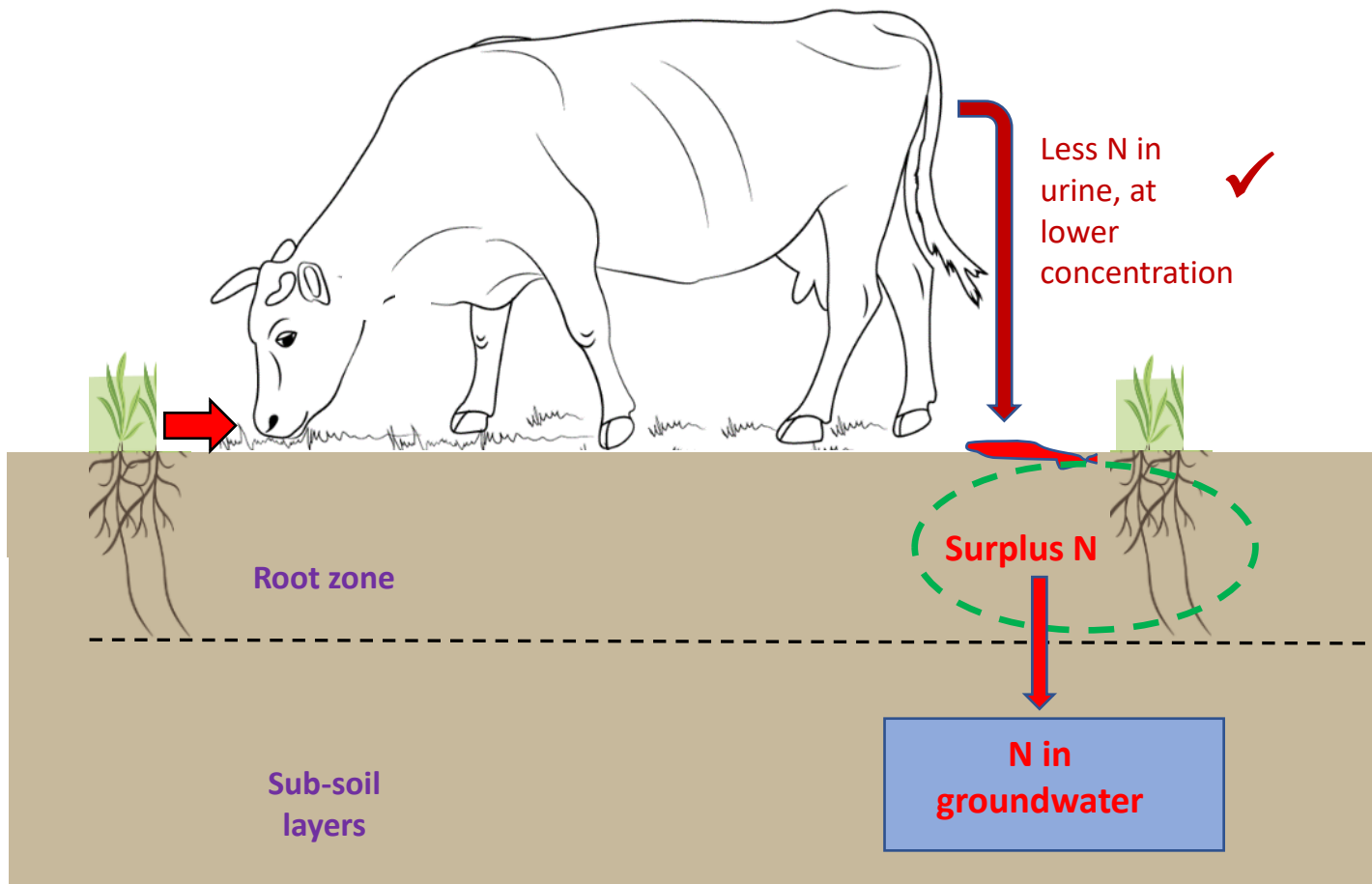
With contributions from Cecile de Klein & AJ Jonker, AgResearch

# THE MITIGATION



- The forage herb narrow-leaved plantain (*Plantago lanceolata*)
- Bred for secondary compound expression (Ecotain)
- Embedded nature positive attributes
- Primarily targeting N leaching
  - 20-30% reductions are well in scope
  - Freshwater quality targets
- Co-benefits for N<sub>2</sub>O, possibly CH<sub>4</sub>
- Commercially available, farmers are using it now

# THE CONCEPT AND EVIDENCE

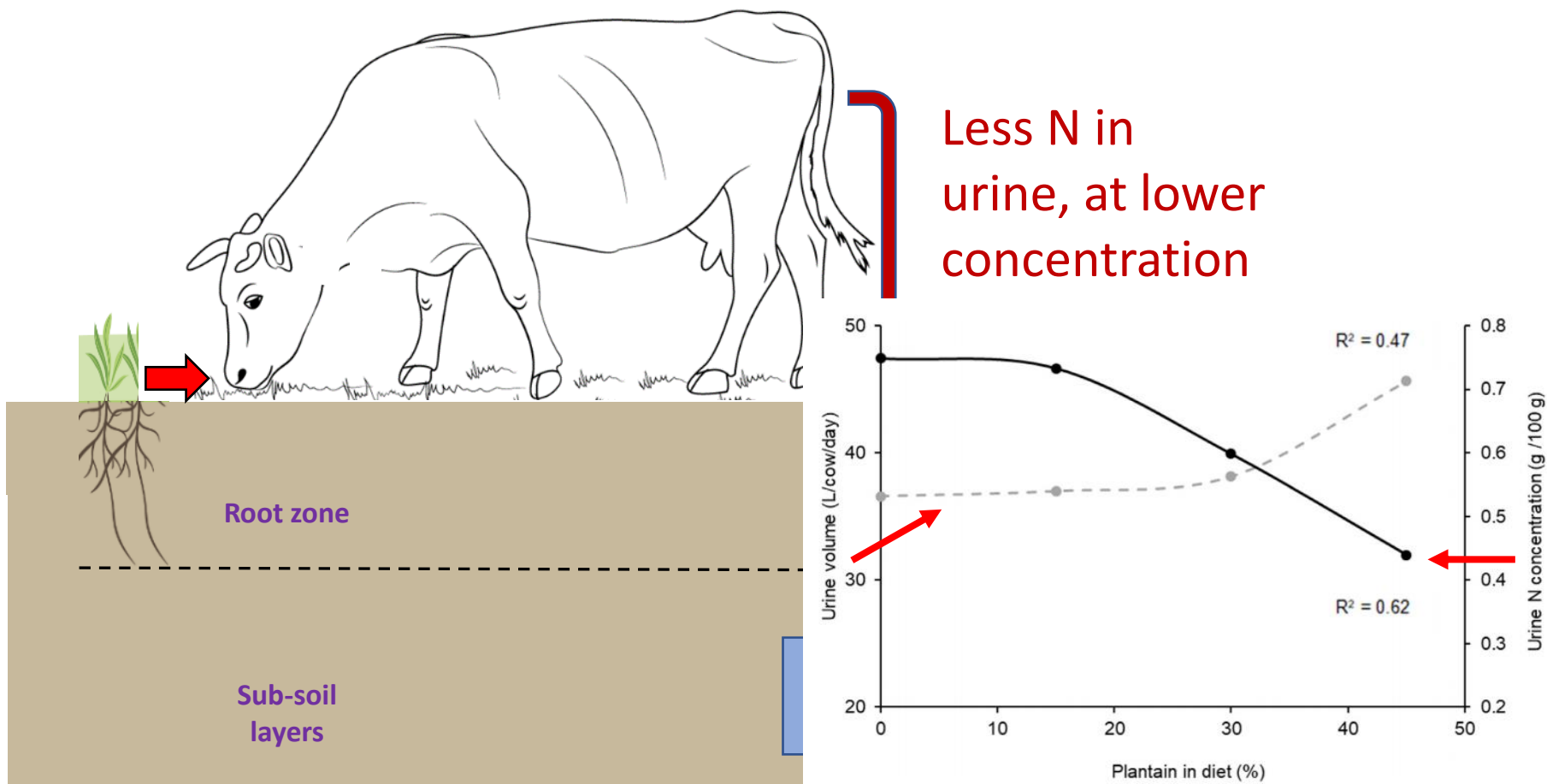


Two main pathways

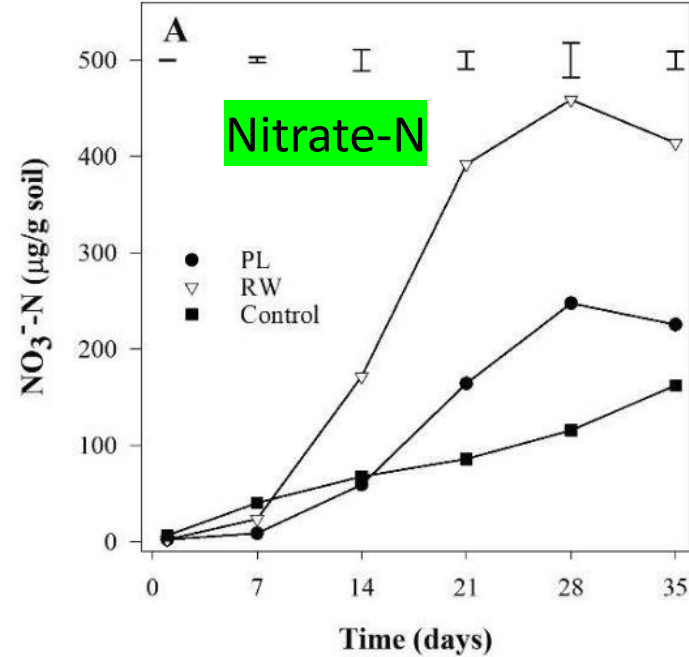
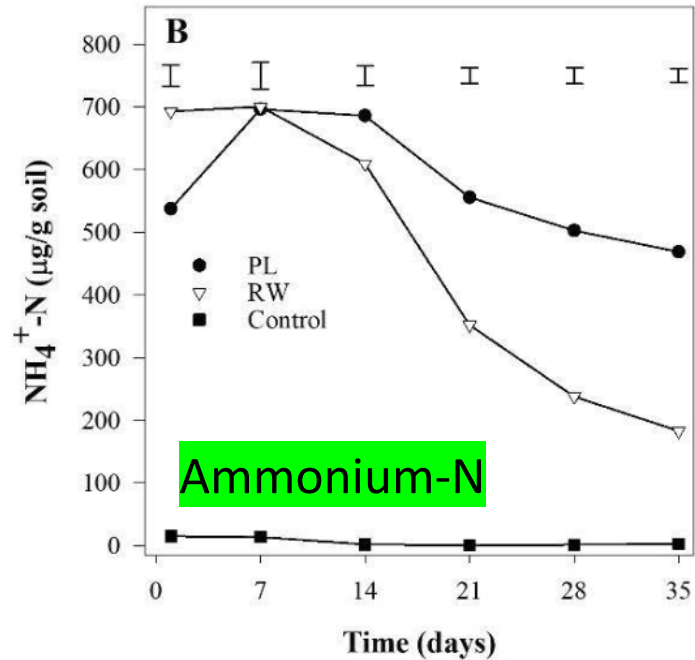
More N retained in root zone for longer



# THE CONCEPT AND EVIDENCE



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More N  
retained in  
root zone for  
longer

Sub-soil  
layers

N in  
groundwater

# THE CONCEPT AND EVIDENCE

## Plantain and CH<sub>4</sub>

CH<sub>4</sub> emission intensity from non-lactating cows fed ryegrass or 100% plantain

	DM intake (kg/day)	CH <sub>4</sub> (g/kg DMI)
<u>Period 1</u>		
Perennial ryegrass	8.7	24.4
Plantain	7.8	20.8
s.e.d./P value	0.67 / NS	1.01 / <0.01

# THE CONCEPT AND EVIDENCE

## Plantain and CH<sub>4</sub>

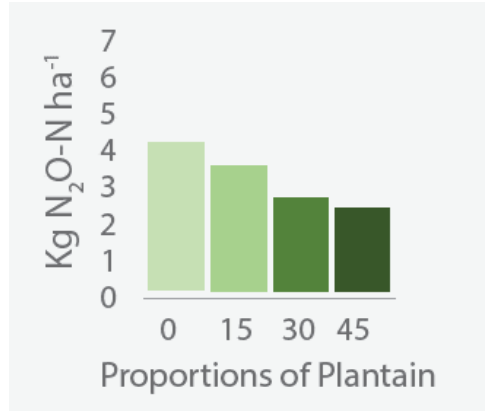
CH<sub>4</sub> emission intensity from non-lactating cows fed ryegrass or 100% plantain

	DM intake (kg/day)	CH <sub>4</sub> (g/kg DMI)
<u>Period 1</u>		
Perennial ryegrass	8.7	24.4
Plantain	7.8	20.8
s.e.d./P value	0.67 / NS	1.01 / <0.01
<u>Period 2</u>		
Perennial ryegrass	9.3	24.6
Plantain	9.0	17.7
s.e.d./P value	0.12 / = 0.01	0.49 / <0.01

# THE CONCEPT AND EVIDENCE

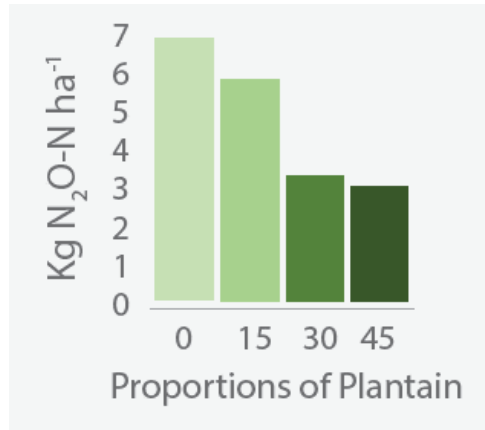
## Plantain and N<sub>2</sub>O

**PLANT  
EFFECT**



$r^2 = 0.913, p < 0.05$

**URINE +  
PLANT  
EFFECT**



$r^2 = 0.969, p < 0.05$



# WHERE TO NEXT?

## **Build confidence, drive implementation**

- Expectation = ~ 30% plantain in pasture/diets will be required
  - Single largest change to the grazed pasture base in NZ for many decades
- Many questions from farmers!
  - How to establish and maintain required amounts in pasture/diet
- Tikanga and kaitiakitanga values
- Credit for adoption in Regional Council consenting frameworks
  - Overseer, auditing processes
- Risks for product quality and market access
  - Milk composition and processability, animal health/welfare
  - Beware the DCD experience

# WHERE TO NEXT?

## Possible up-sides

- Soil effects
  - Nitrification inhibition
  - Other?
- GHG reductions, other co-benefits
- Differentiated products?
  - Embedded 'nature positive' attributes
  - Market premiums?
  - Positive human nutrition attributes?

# WHERE TO NEXT?

## Sustainable Food & Fibre Futures Partnership: Plantain potency and practice

Ministry for Primary Industries  
Manatū Ahu Matua



PGG Wrightson Seeds

DairyNZ



MASSEY UNIVERSITY  
TE KUNenga KI PŪREHUOA  
UNIVERSITY OF NEW ZEALAND



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## CONCLUDING COMMENTS

- Abundant promise: freshwater quality,  $\text{N}_2\text{O}$ , possibly  $\text{CH}_4$
- Clear proof of concept, now moving to proof of practice at scale and adoption
- Technical issues to resolve
- There is an implementation pathway
- Co-development principles to drive adoption
- Will require confidence, alignment with regulatory processes, and more
- Value chain approach essential – e.g. potential for differentiated product stream(s)?



# Ngā mihi nui





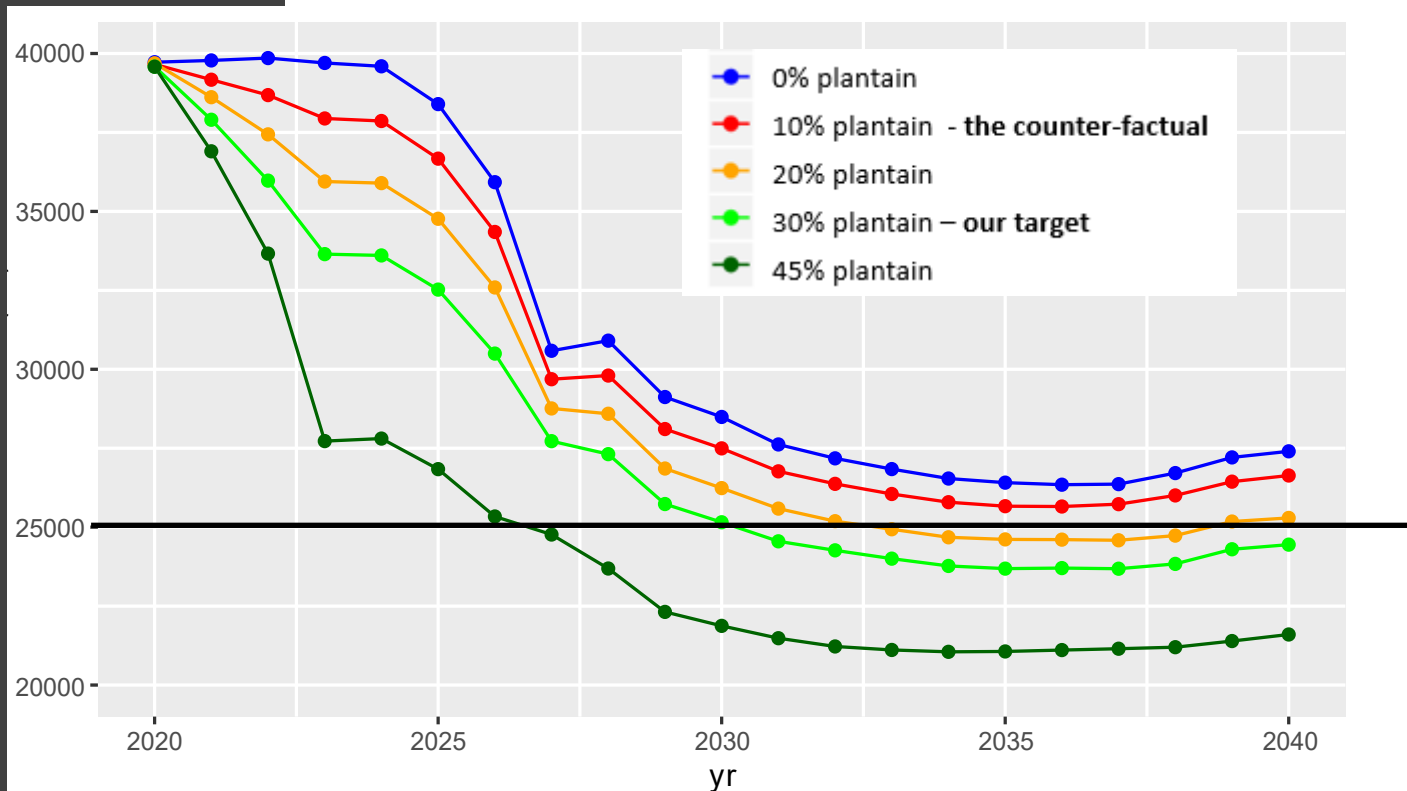


# HOW MUCH, BY WHEN?

## NPS-FM and NES-FW 2020

- Direct, significant effect on 4,200 NZ dairy farms
- 15,000 t reduction in N leaching

Total nitrate leached from regulated catchments (tonnes N)



# WHERE IS THE RESEARCH GOING NEXT?

Confirm the  
technology is:

By:

Effective

Confirming that lysimeter results scale up to  
reductions in farm scale N leaching

Transferable

Determining how mechanisms interact with soils,  
climate and management across regions

Safe and value-  
adding

Testing product characteristics, animal health and  
welfare to build integrity and monetise benefits

Adoptable

Farmer co-development; regional/environmental  
variation; building tools and resources;  
incorporating iwi values; catchment and sector  
impacts