

Farming with a N fertiliser cap

Lessons from the Hinds and Selwyn
Partner Farms

&
Science Evidence

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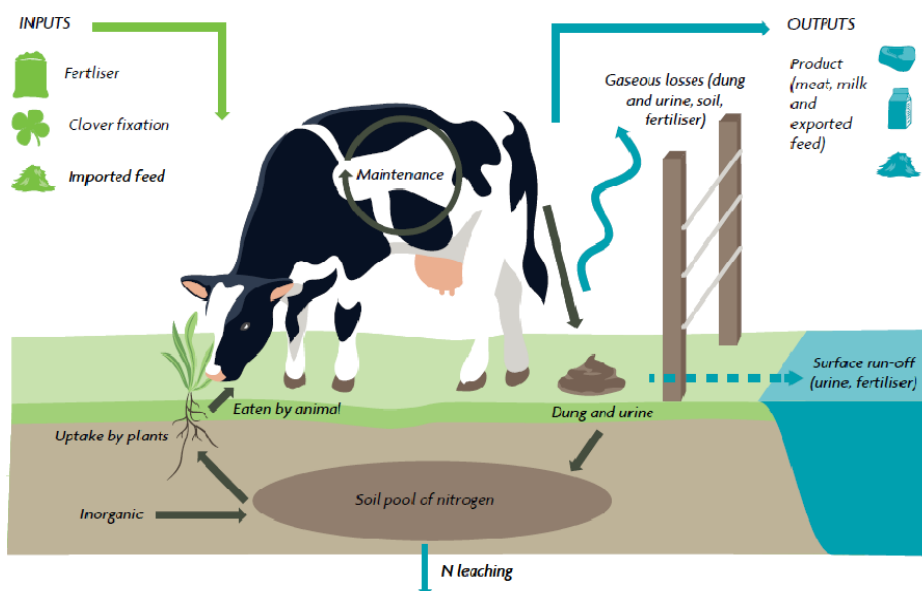
Presentation plan

- Current N fertilizer use in Canterbury
- What drives high N fertiliser use on farm?
- How to transition to a low N fertiliser system?
- How low can we go without affecting profit
- What is science telling us

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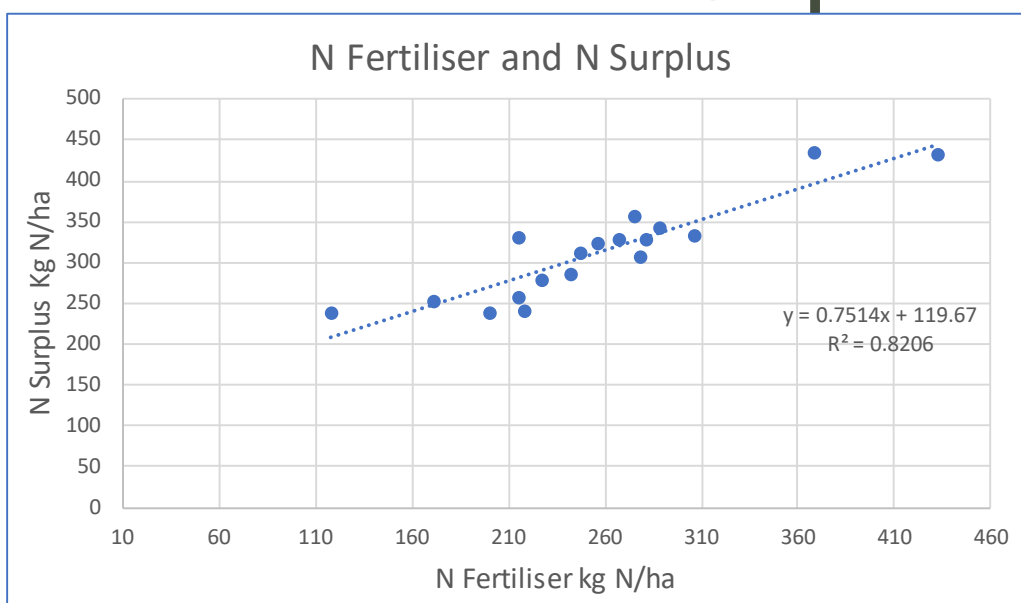
N fertiliser use and the nitrogen cycle



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N Fertiliser and N Surplus



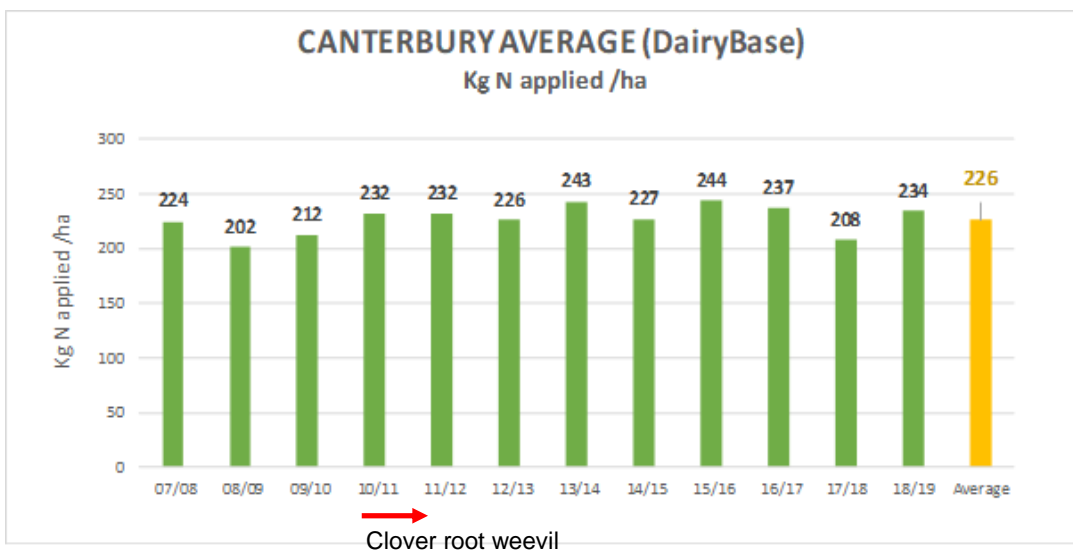
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N Cap – 190 kg N/ha

- Proposed to begin in July 2021
- Only pastoral need to report N use to regional councils
- Still to get clarity on:
 - Fertiliser use over which area (total/effective)
 - How effluent and non-effluent areas will be considered
 - How N use on crops in the milking platform will be considered
- How is this going to be monitored

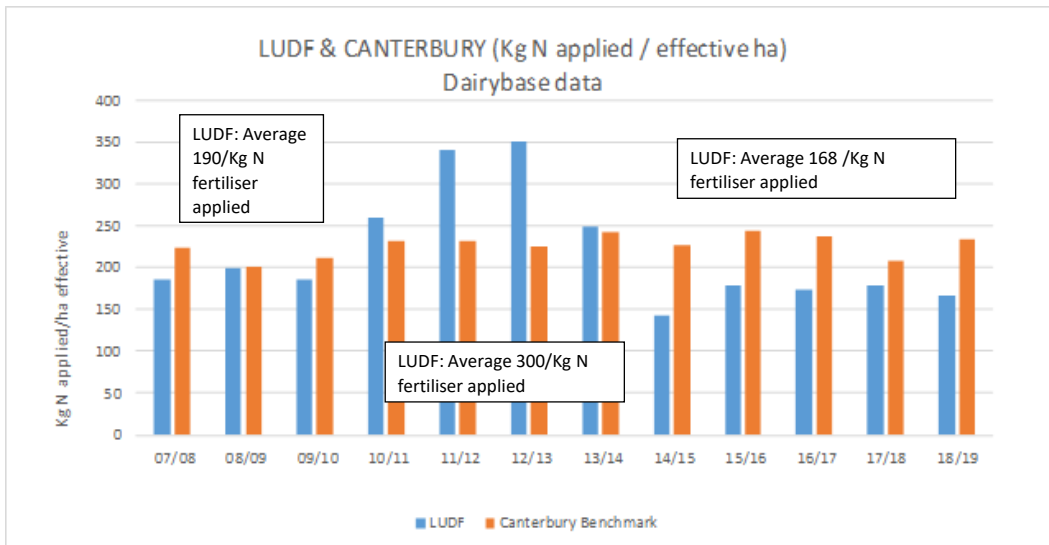
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Canterbury Benchmarking = 227 kg N/ha
Irrigo = 227 kg N/ha (247 average last 4 years)

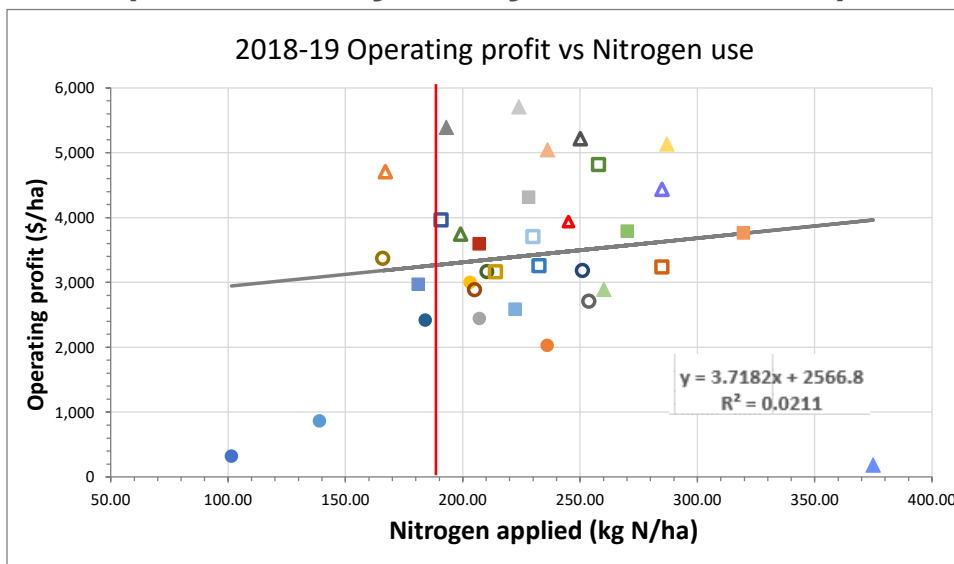
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Nitrogen use at LUDF



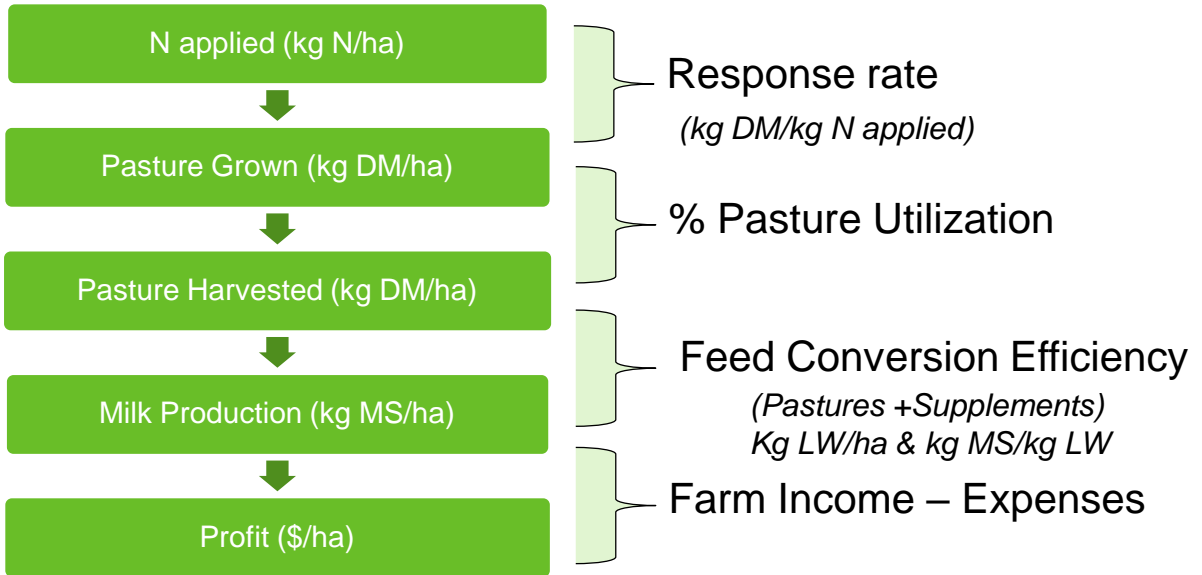
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Kg Nitrogen applied & Operating profit per ha (Canterbury Dairybase 2018/19)



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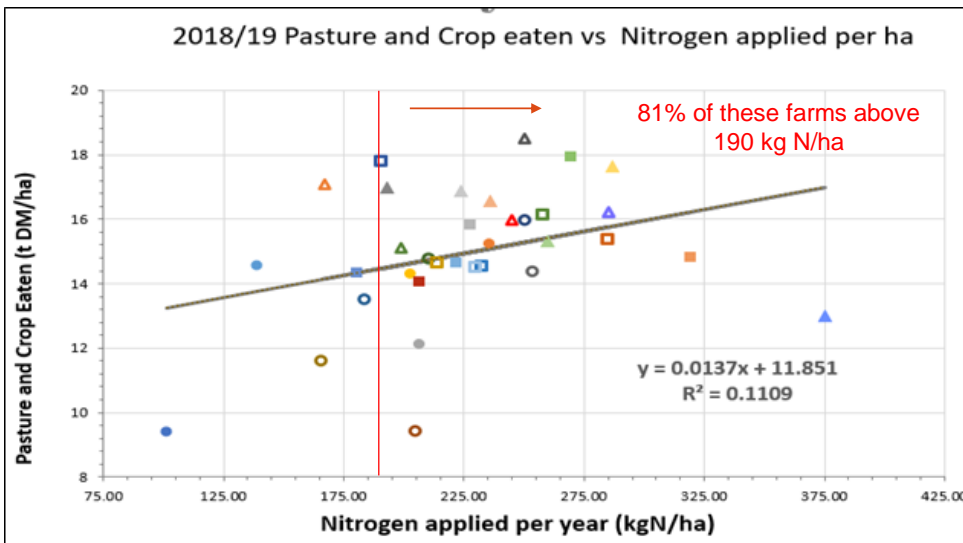
N Fertiliser use & Profit



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Kg N applied & pasture and crop eaten (Canterbury Dairybase 2018/19)

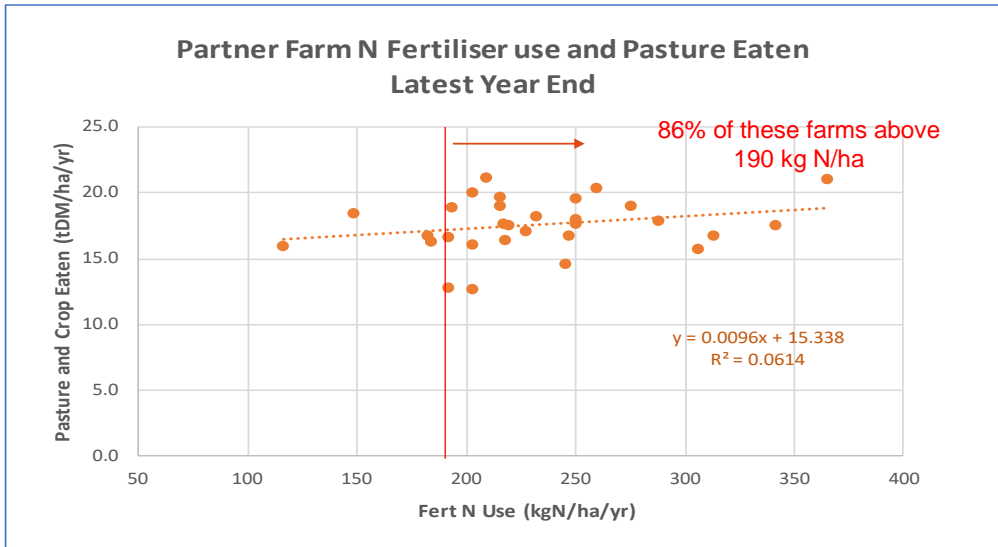


Average = 227 kg fertiliser N/ha

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Kg N applied / Pasture and crop eaten Hinds and Selwyn Partner Farms



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Tactical use of nitrogen

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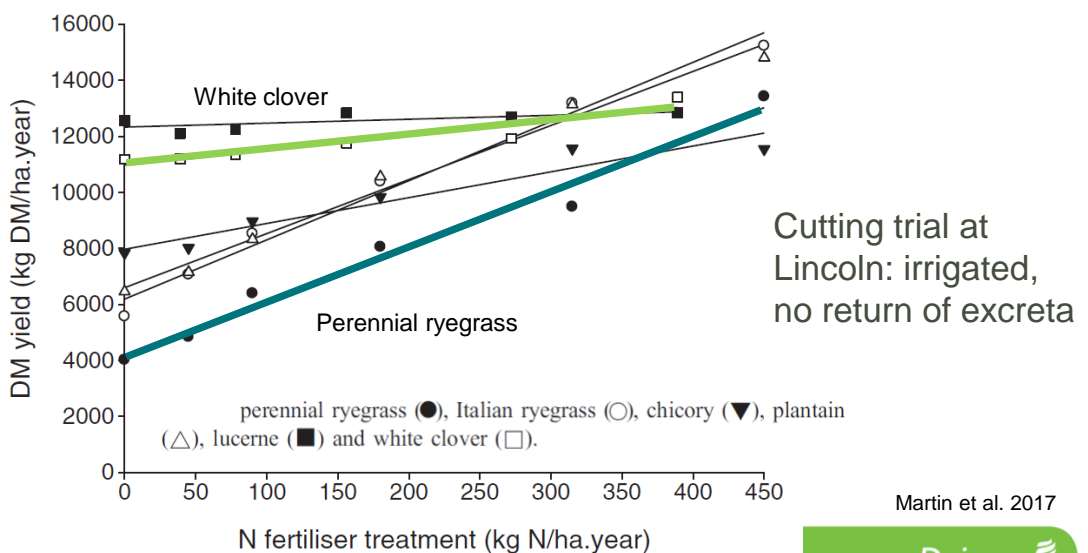
Some N fertiliser facts to remember

- Pastures with clover don't **need** N fertiliser, but
- NZ pastures are inherently N deficient – they will **respond** to N fertiliser
- Low (<6°) and **high** (>16°) soil temperatures inhibit pasture growth and response to N fertiliser
- It takes 20 (spring) to 40 days (autumn) to get **significant** yield response – use feed wedge
- For max response: optimal soil fertility, no weeds, pests or diseases

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Grass and herbs respond well to N fertiliser, legumes hardly

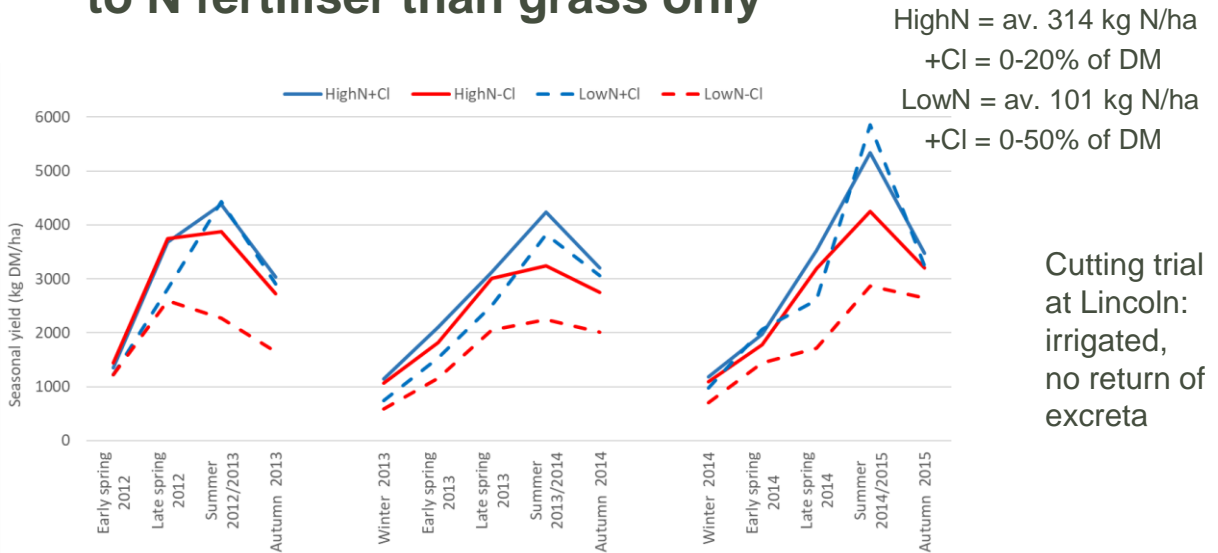


Martin et al. 2017

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Grass+clover yields more and responds less to N fertiliser than grass only

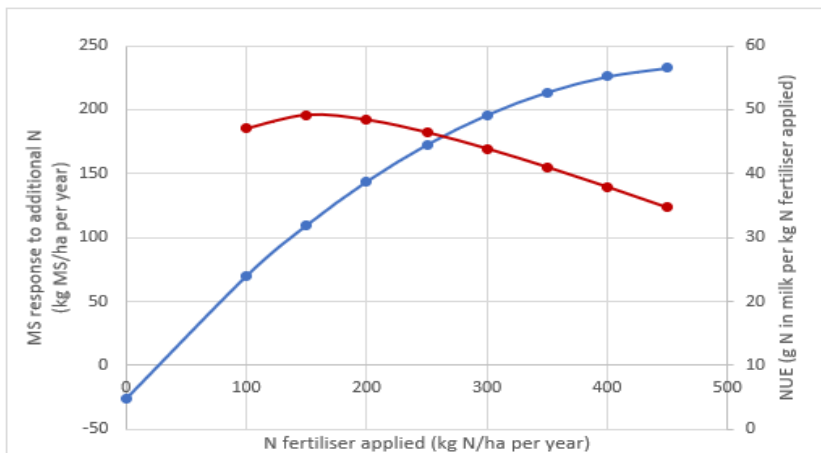


Chapman et al. 2018

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Response rates



N losses increase disproportionately with N fertiliser rates above 200 kg N/ha/year (Ledgard et al. 2007)

Diminishing returns with increasing rates

Clark 1997 – seven North Island studies

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Pastoral 21 (2011-2015) – reduced inputs, increased efficiency

Canterbury	“Low input”	LUDF	“High input”
Stocking rate (cows/ha)	3.5	3.9	5.0
Cow genetic merit (BW)			
N fertiliser (kg N/ha)	Up to 150	313	Up to 400
Grain feeding (kg/cow)	Up to 100	0	Up to 800
Standoff – urine collected	no	no	no
Average production (kg MS/ha)	1,700 (-24%)	1,821	2,241
Average operating profit (\$/ha)	4,300 (+2%)	4,395	4,205
Average N leached (kg N/ha)	32 (-30%)	39	46



Chapman et al. subm.



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1st step to reduce N leaching and emission of nitrous oxide: tactical use of N fertiliser

- Apply less fertiliser on effluent area (e.g. aim for same total N)
- Apply low rates of N per application (e.g. 25 kg N/ha)
- Graze at 2.5-3 leaves for max response and quality
- Use fertiliser when feed is required or when response rates are high to carry over feed
- Don't apply to heavy stocked areas – front of paddocks, around troughs

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Partner farms

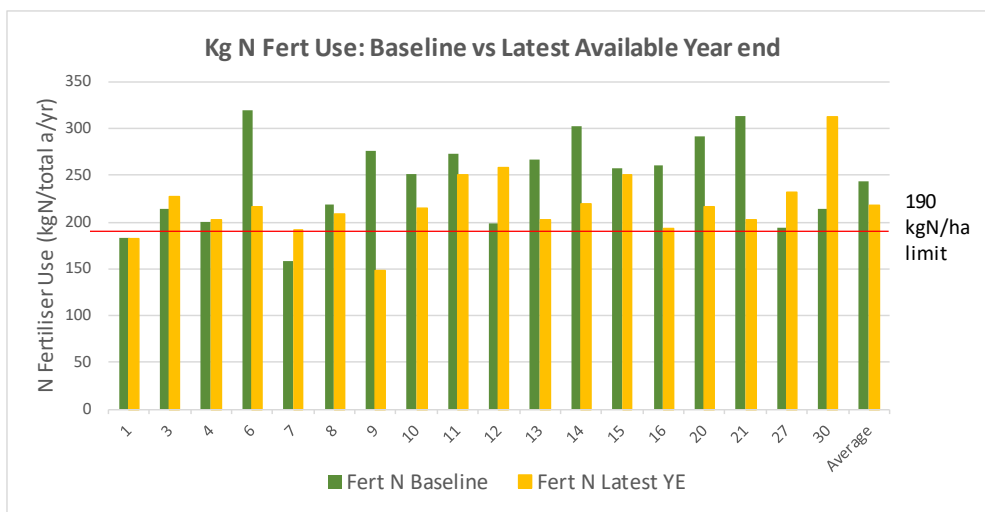


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Kg fertiliser N applied (Partner farms)

Baseline period= 244 kg N/ha
Average Year end = 218 kg N /ha



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High N use - common mistakes

- Inadequate monitoring and recording of N use
- Following the cows specially when on fast rounds (< 20 days)
- Using high rates at each application that cannot be taken by plants being at risk of being lost
- Extra N boosted grass poorly utilized e.g. excessive pre-grazing mowing or topping

Transition period to lower N use

- Significant reductions (+ 60 kg N/ha) will require time to adapt to new system
- Successful transition better to do in stages rather than in one blow
- Clover needs time to re-establish and be actively fixing
- Ensure all other limitations are lifted

Transition to low N

330 – 280 kg N

Most farms could take this step without major effect

280 – 230 kg N

Good planning and management is required

230 – 190kg N

Last 40 Kg N could be challenging

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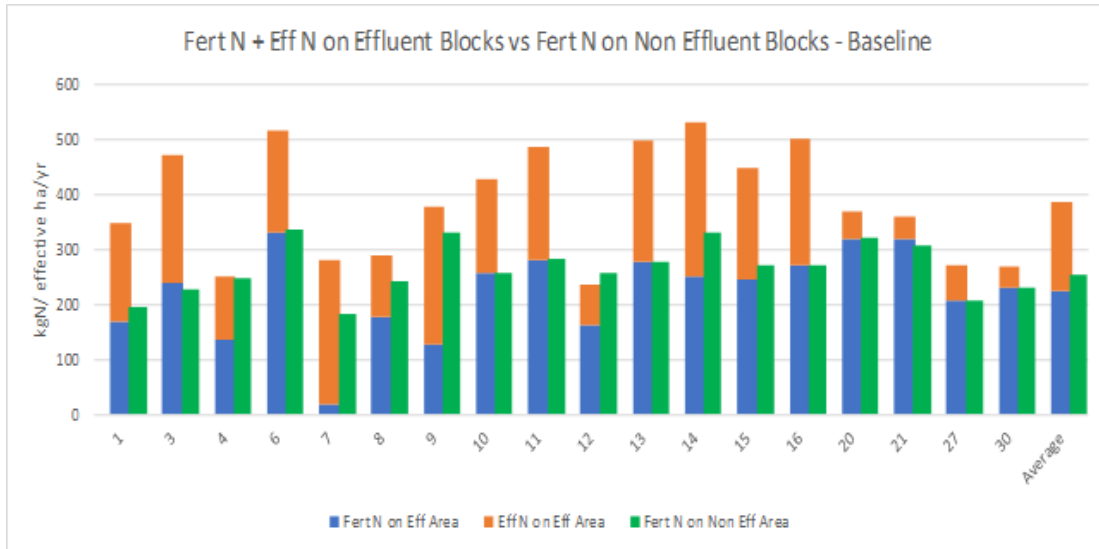
Top Tips – farmers using <200 kg N

- Efficient Irrigation/ less drainage less N loss
- Having a plan with good monitoring
- Lower N fert use on effluent blocks
- Placing of Fertiliser and precision tracking
- Slower grazing rounds (2.5-3 leaf stage)
- Timing of application (no N Jan or Feb)
- (Sustain/N-Protect) Gibberellic acid , Fertigation
- Lower Rates

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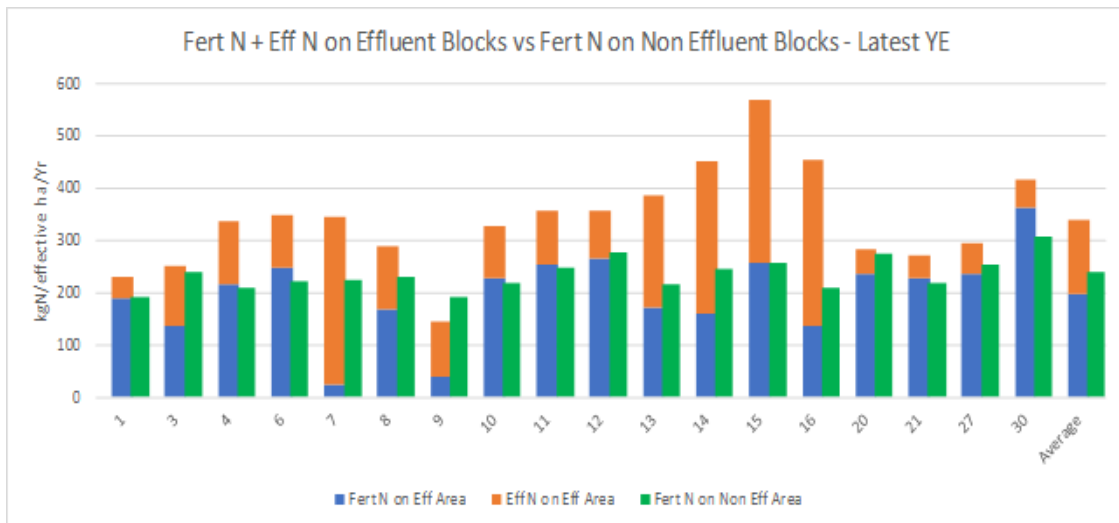
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Kg N applied effluent/non effluent blocks: Baseline Period



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Kg N applied effluent/non effluent blocks: Year end



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