



PRODUCTIVITY & PROFITABILITY

series

Liming. How much and when?

Presenter: Dr Jason Condon



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Thanks to



Anne-Maree Farley, Dr Richard Hayes, Matt Newell, Dr Guangdi Li (NSW DPI)
Dr Brooke Kaveney, Grace Kaveney, Aaron James, Tom Price (CSU)
James Holding (FarmLink), Helen McMillan (CWFS), Nick McGrath (HLN)
Barry Haskins, Rachael Whitworth, Albert Gorman, Luke Schulz (AgGrow Agronomy & Research)
Anna Van Dugteren, Jenilee Cumberland (ACT NRM)

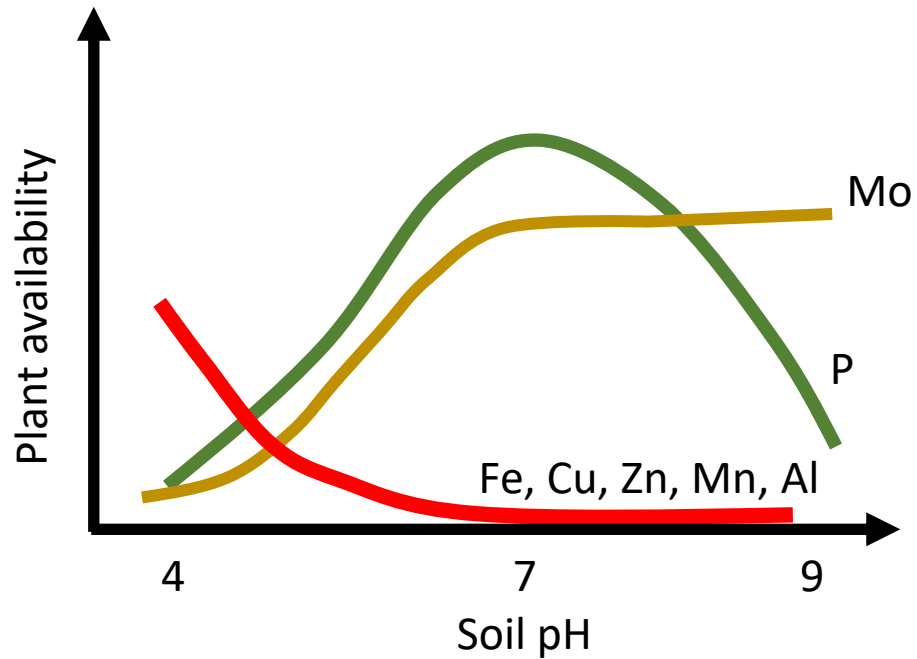
Many thanks to the advisors and producers that work with us
– especially those that host our trial sites



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So what's the problem?



- pH induced toxicities (Al, Mn)
- pH induced deficiencies (Mo and P)
- Inefficiency of fertiliser applications

Source: agric.wa.gov.au



So what's the problem?

- ↓ roots
- ↓ pH water and nutrient uptake
- ↓ plant performance
- Loss of effect legumes
- Loss of OC – food for microbes (nutrient cycling, N fixation)
- Response to observation poor performance?



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How did we get here?

- Some soils are naturally acidic
- Agriculture is an acidifying business
- How fast? - starting pH, soil pH buffering (OC and CEC), production
- Perennials are just as acidifying as annuals



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So what's the problem?

How much does it hurt us?

- Liming trials, test strips
- Be careful interpreting

4 t lime /ha



Always soil test



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What we know

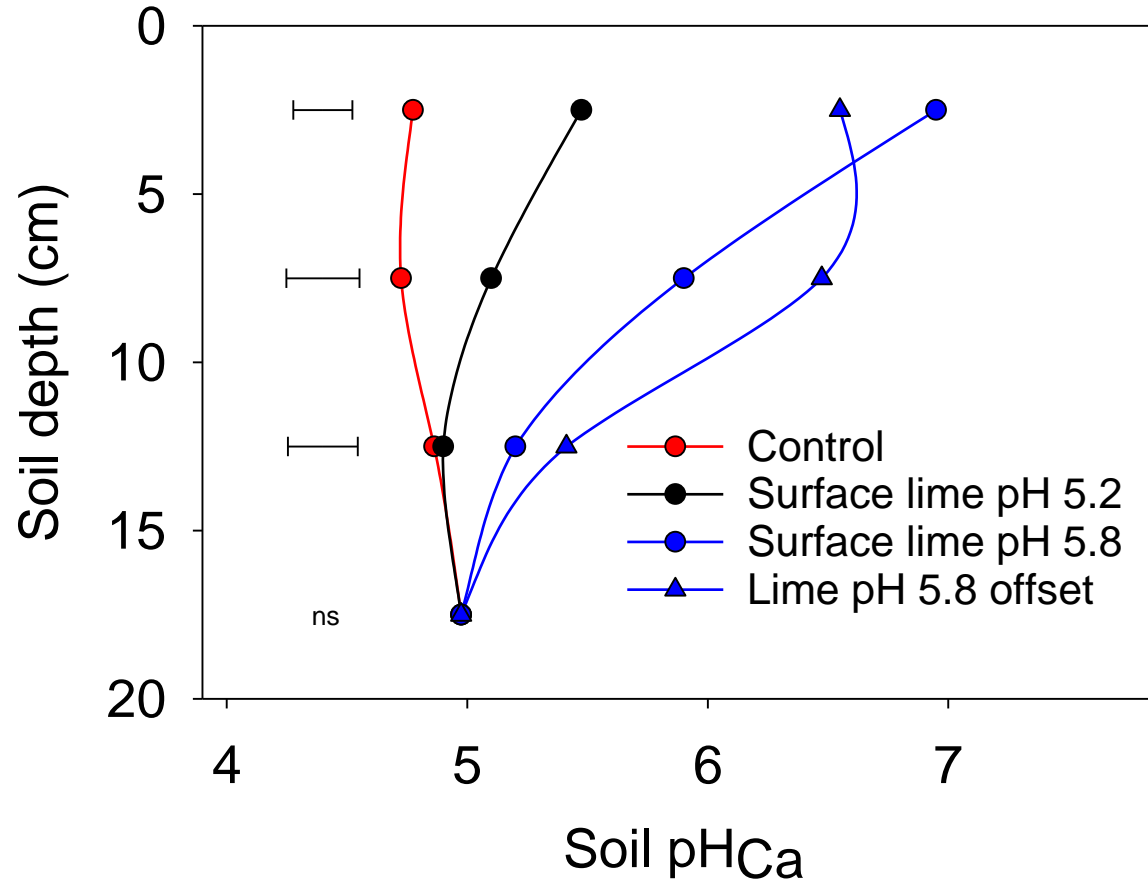


- Lime works to increase soil pH
- Doesn't dissolve at $\text{pH}_{\text{Ca}} > 7$
- Doesn't move if $\text{pH}_{\text{Ca}} < 5.5$
- Incorporation of lime is great if you can



What we know

Temora FarmLink est. 2020



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“I can’t take your graphs to my bank manager”

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What's the gain in production?

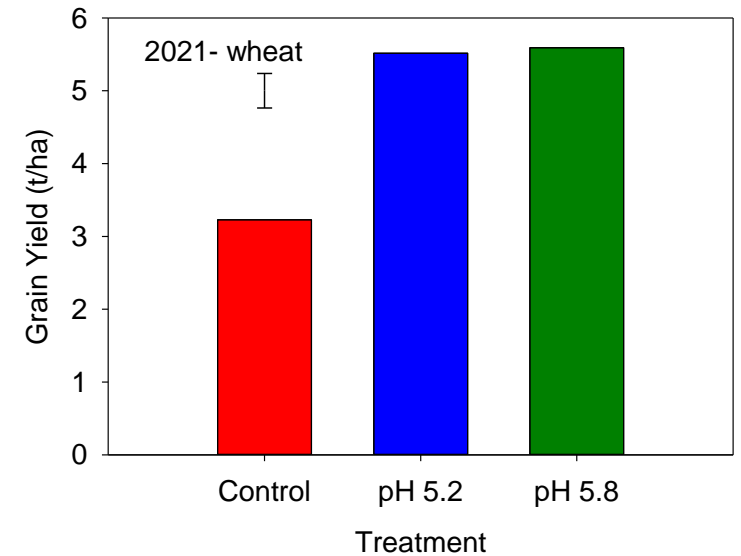
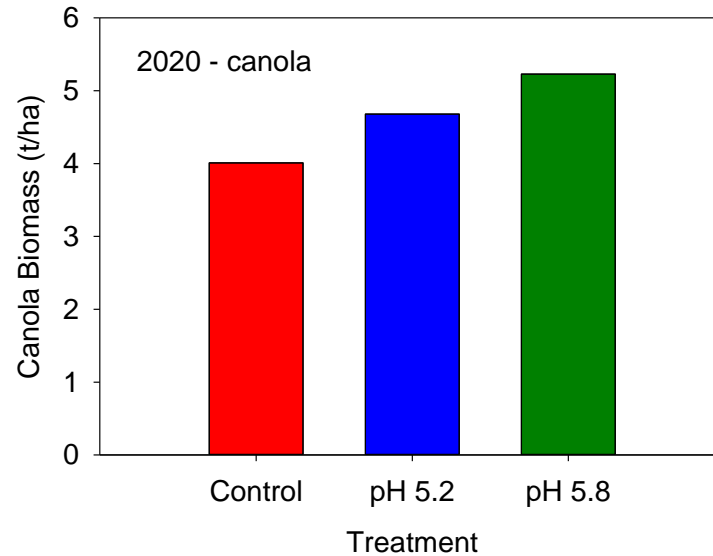
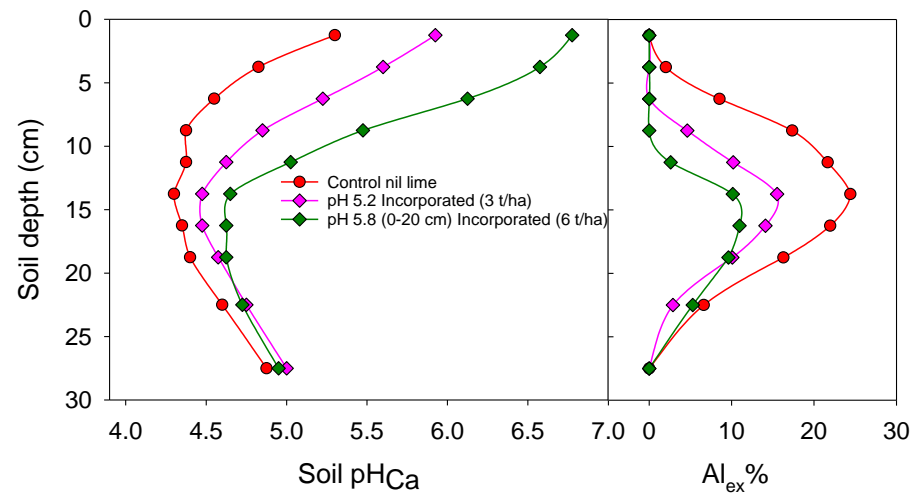
- Response depends on starting point and what you are growing
- No crop yield gains from wheat or canola in pH at $\text{pH}_{\text{Ca}} > 4.8$
- New MLA funded project - pastures on acid soils



What's the gain in production?



Morven HLN est. 2019



What's the gain in production?

- Cropping sequence trials (GRDC, CSIRO and NSW DPI)

System gross margin \$/ha/year (2018-2023)

Source : Mat Dunn

	<u>Barley-Canola-Wheat</u>		<u>Faba/Lupin-Canola-Wheat</u>		
Condobolin	\$780		\$730	-\$50	Acid
Urana	\$820		\$990	+\$170	
Wagga	\$900		\$800	-\$100	Acid
Greenethorpe	\$1110		\$1180	+\$70	Ameliorated



What's the gain in production?

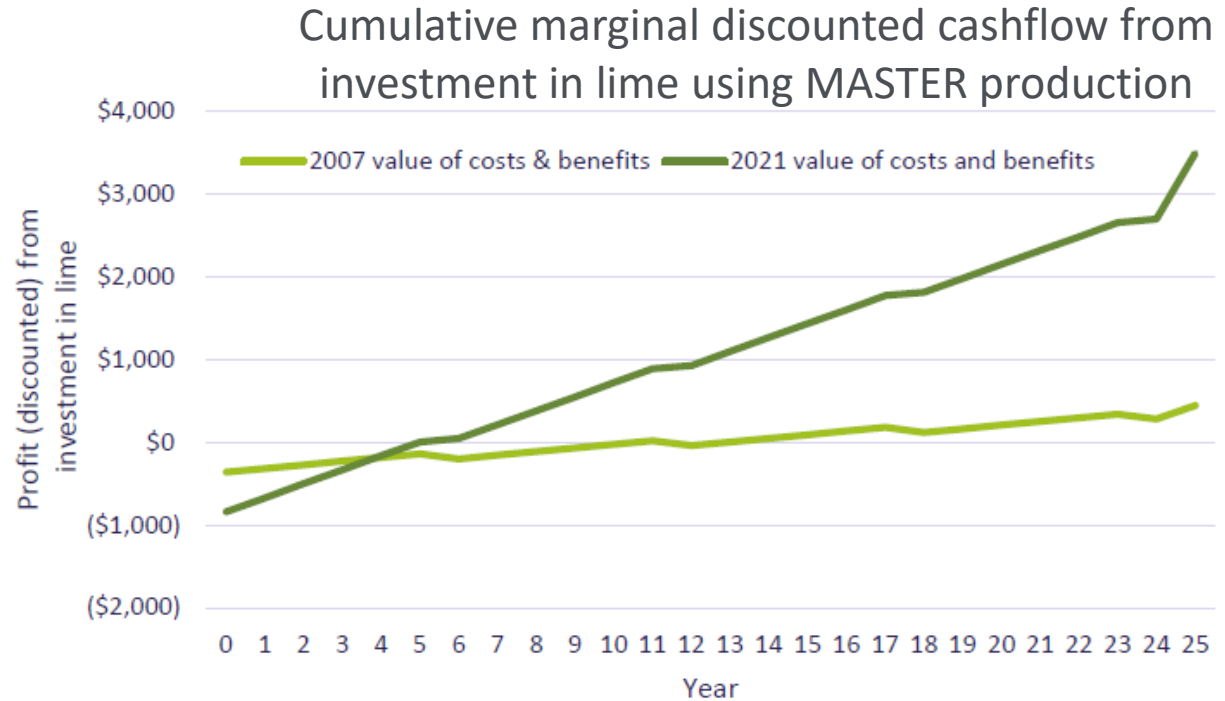
Location (Region) years	Enterprise/Pasture	Response to lime	Average annual gross margin (\$/ha c.f no lime)	Reference
Wagga Wagga (SE slopes) 1992-2004	Sheep/Perennial	+3.8 DSE (25%)	+\$25	Li and Conyers (2006), Brennan and Li (2006)
Ebor (Northern TL) 1999-2002	Cattle/Improved	+16% more beef production	+\$89	Duncan (2003)
Binalong (Southern TL) 1999-2004	Sheep/Perennial	+2.4 DSE (+5.6 DSE annual SSP)	-\$4 (+\$46)*	Leech (2006)
Laggan (Southern TL) 2015-2020	Sheep/Perennial	+2.9 DSE	+ \$181	Lieschke (2021)

Note gross margins are those at the time of research and does not account for current commodity prices



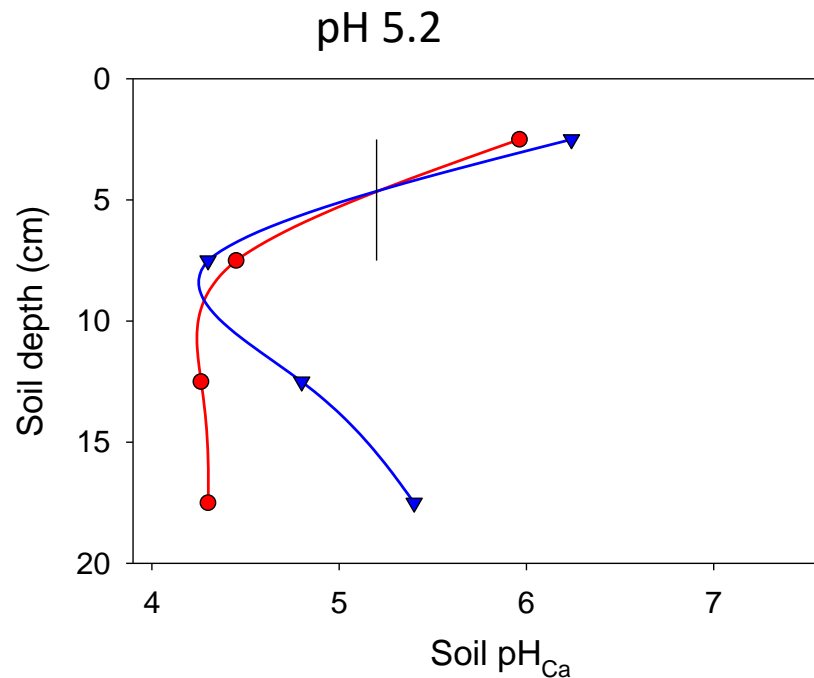
What's the gain in production?

- Agvista analysis
- Comparison of 2007 to 2021 costs and commodity prices
- Highly sensitive to price



Liming. How much and when?

- Know your current situation (soil testing, pasture composition, roots)
- Sampling in 5 cm intervals to 20 cm - Colwell P, pH, cations inc Al^{3+}



Interpretation

Red long-term problem

Existing pasture quality?

Work out a plan:

- Situation – established or new (broadcast or incorp)



Liming. How much and when?

- Doing nothing is not an option on acid soils
- Know your current situation (soil testing, pasture composition, roots)
- Consider your production needs – ability to capitalise on more production
- There is no substitute for alkali to fix acid soils (P and Mo are not solution)
- There is no one right time, or situation – but you need a plan – a lime strategy
- Prioritise paddocks base on expectations, result of monitoring, long-term plan



Liming. How much and when?

- Eg High performing paddock versus poor
 - “Poor”
 - Why is it poor?
 - Is it likely to respond?
 - Are there legumes present?
 - Are you going to sow a new pasture?
 - “High performance”
 - When was your last soil test?
 - What is the trend through time?



Liming. How much and when?



- Decision based on the individual



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Not all production is equal

Mannus HLN est. 2021



April 2024



Source : Nick McGrath (HLN)

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Not all production is equal

CSU farm - lime 1989

Drought

A more resilient system

More ground cover



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