



Department of
Primary Industries

Managing mineral balance in sheep grazing cereals



With livestock markets booming and renewed interest in pasture renovation, Riverina Local Land Services is working with the NSW Department of Primary Industries (NSW DPI) to host a Riverina Pastures Research Update.

This workshop will set you on the right path for this year's pastures sowing, management and considerations for the future. Topics include:

- getting the most out of lucerne pastures to maximise production and persistence
- the latest guidance on managing soil acidity in the cropping zone
- hard seeded Legumes - the grower perspective
- tropical grasses for southern environments - what are the opportunities?
- how to best manage mineral balance in sheep grazing cereals
- farming smarter – spatially managing acid soils for improved pasture establishment and production
- pasture management to obtain profitable grazing outcomes.

The latest research will be on show from the NSW DPI Pastures and Livestock Systems Team and leading industry consultants. There will be plenty of opportunity for your questions to be answered.

Griffith: 9 March 2021: 8.30am-3.30pm. Griffith Exies Club, Jondaryan Avenue.

Wagga: 10 March 2021: 8.30am-3.30pm. Joyes Hall, Charles Sturt University.

Dr Gordon Refshauge

NSW DPI

Cowra Agricultural Research and Advisory Station



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Background

The grazing of annual wheat has experienced widespread and rapid adoption

Forage is high energy, high protein, high forage and livestock growth

Higher winter carrying capacity (2100 to 3500 SGD/Ha), greater animal production (about 20 to 54%), minimal grain yield penalties (mgmt.), more pasture growth (40%)

Masters & Thompson (2016)

Fill the winter feed gap x sheep prices = lambing ewes



The problem

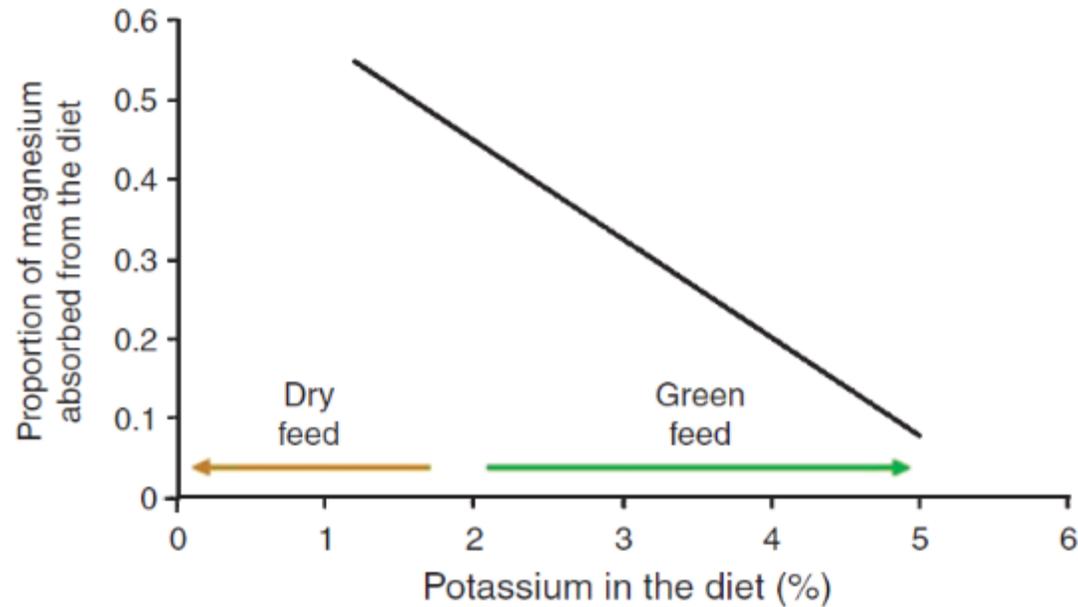
Wheat forages are deficient in sodium (Na), marginal in calcium (Ca) and magnesium (Mg), and excess in potassium (K)

Excessive K and K:Na impairs active absorption of Mg and Ca in the rumen, reducing growth rate and increases health risks for ruminants

Epithelial ion pump

Health risks are grass tetany, milk fever & bone disorders, higher for long-fed lambs, twin-bearing ewes and older pregnant / lactating ewes

The effect of potassium on magnesium



1% change in dietary potassium %

=

10% change in magnesium absorption

Suttle (2010)

Some correlations between soil K and forage mineral

Table 4. Correlation matrix between mineral concentrations in soil and forage
Significant correlations are shown in bold

		Forage				Soil		
		Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Exchangeable Ca	Exchangeable Mg	Exchangeable Na
Forage	Ca	1.00						
	Mg	0.73	1.00					
	Na	0.60	0.85	1.00				
	K	-0.17	-0.05	-0.49	1.00			
Soil	Exchangeable Ca	0.25	0.04	-0.25	0.36	1.00		
	Exchangeable Mg	-0.05	-0.06	-0.24	0.35	0.68	1.00	
	Exchangeable Na	0.26	0.44	0.54	-0.11	-0.13	0.08	1.00
	Colwell K	-0.55	-0.64	-0.75	0.43	0.43	0.66	-0.33

Masters et al. (2018)

The current solution

Lime, Causmag and Salt is the typical supplement

How much?

ad libitum at a ratio of 2:2:1 (volume), or 1:1:1 (weight)

How much per head?

ad libitum or 10 g of each (30 g/day)

Increase animal growth rate (0-60%)

System solution

Biculture forages, of which one component is high in Ca, Mg and Na

Potential sustainability benefits

Animals graze with lower health risks

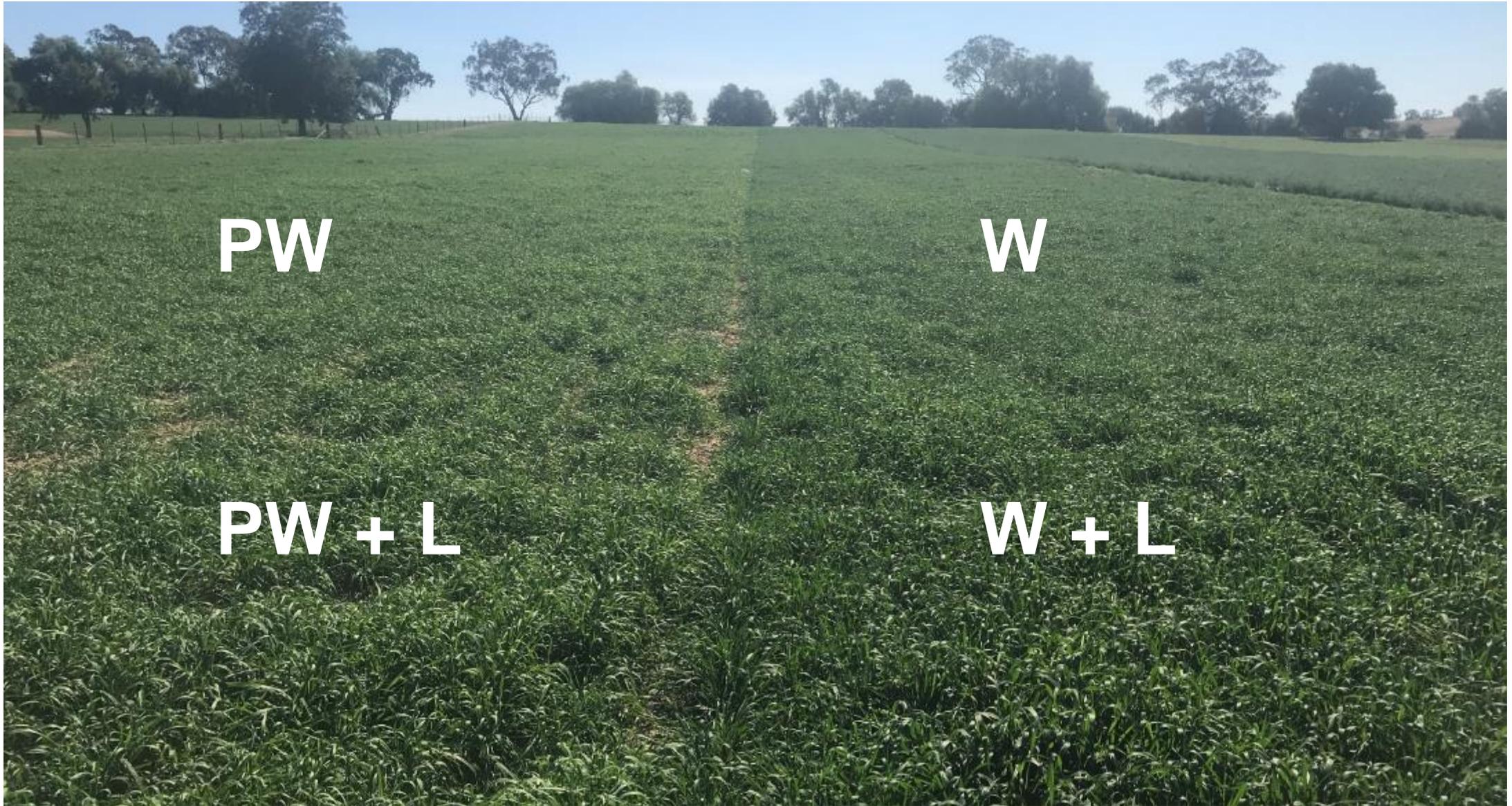
Improve animal performance

Lower cost of production

For example, lucerne is rich in Ca, has adequate Mg, better Na than the wheats **(but still deficient)**

Hypothesis

Adding lucerne to the diet of lambs grazing wheat or perennial wheat will improve the metabolic status of Ca & Mg



PW

W

PW + L

W + L



Forage cut daily



This is 600 g DM,

**So we fed two to three
times each day**

0.9 to 1.4 kg DM intake



Lambs fed individually

- Feed intake
- Lamb growth rate
- Palatability
- Mineral balance effects

Weekly blood and urine collection

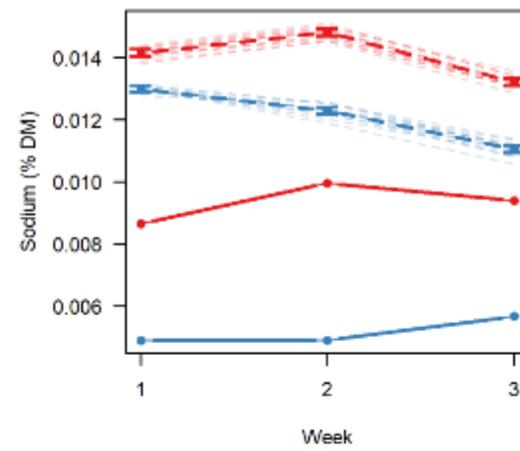


Forage mineral content

Large dietary differences due to treatment



Extremely deficient in Na
(0.06%)



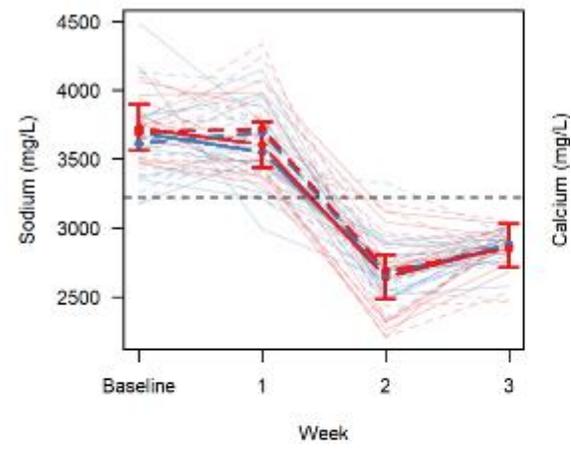
W+L
PW+L
W
PW

Plasma mineral content

Large differences due to time but not treatment



Deficient in Na



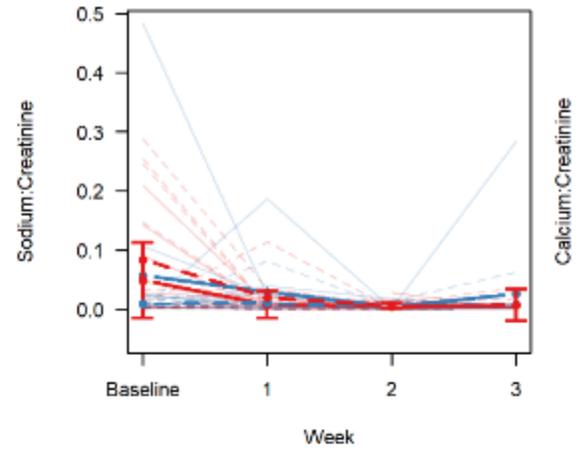
- W+L
- PW+L
- W
- PW

Urine mineral excretion

Some differences due to time but not treatment



Extremely low Na (x10)



- - W+L
- - PW+L
- W
- PW

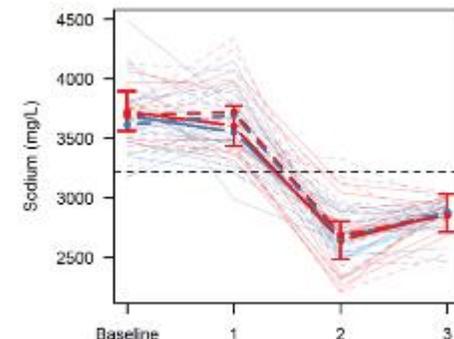
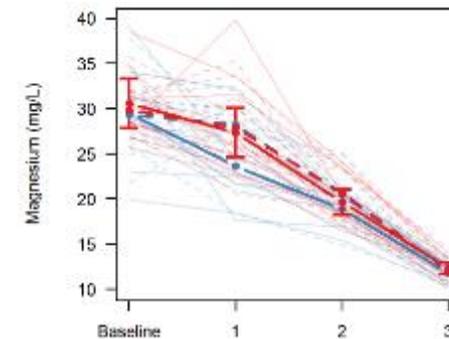
Take home messages

Adding lucerne to wheat:

Increases dietary Ca, Mg and Na intake, and feed balance ratios (not shown),

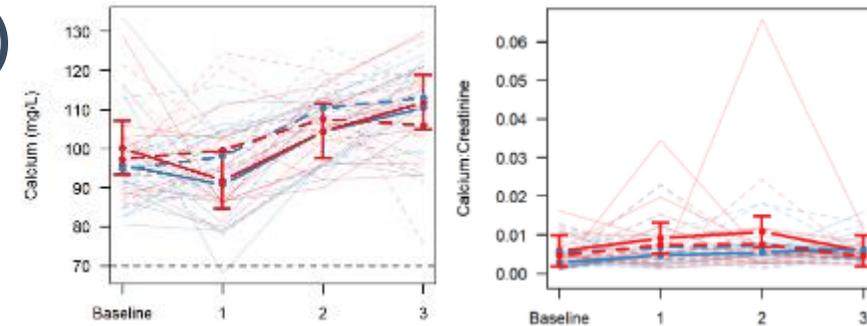
but did not improve plasma or urine minerals

Plasma Mg and forage Na the real threat



Take home messages

Increased plasma Ca, without change in urine Ca is **difficult to explain** (homeostasis; more lab tests required)



Hypothesis rejected:

Lucerne doesn't solve the problem on its own. We still need Na and Mg with lucerne... but not calcium

Wheat only diets: Suppl. 15 g salt + 12 g MgO + 10 g Ca (40g/day)



THANK YOU FOR YOUR ATTENTION

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