



Department of
Primary Industries

Nutritional requirements of growing bigger sheep, faster

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Do we need to supplement sheep on high quality pastures?

1. Macronutrient minerals
2. Dietary mineral balance



What is DEMAND?

- ❑ Nutrient demand is influenced by weight, growth and reproduction
- Highest demand is in:
 - 1) twin bearing ewes in late pregnancy and early lactation
 - 2) heavy weight, fast growing lambs
- More or less, mineral requirement *per kg DM* is proportional

Intake, protein and energy

Intake (kg DM/day)

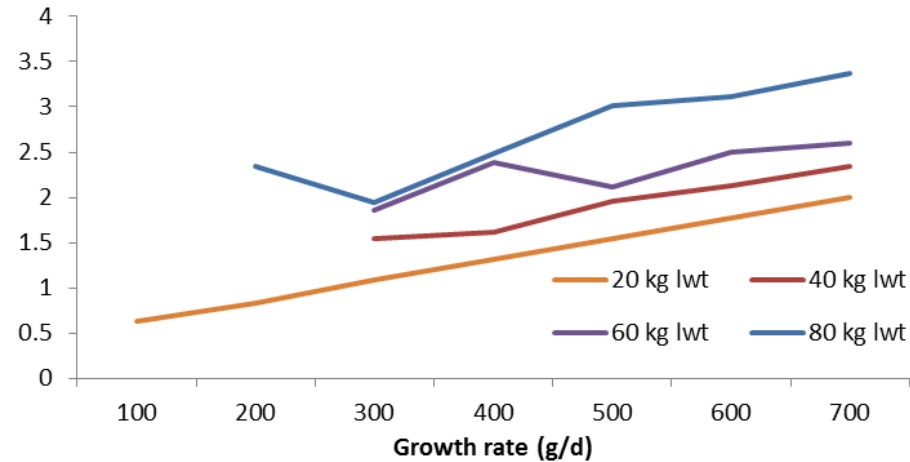
Protein (Crude protein; CP%/kg DM intake)

Energy (Megajoules; MJME/kg DM intake)

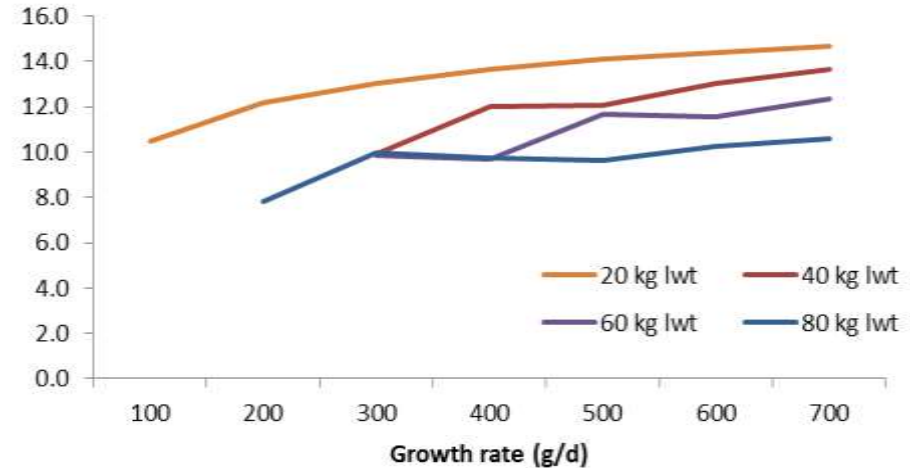


Energy and Protein – 4 month old lambs

Feed intake
(kg DM/d)

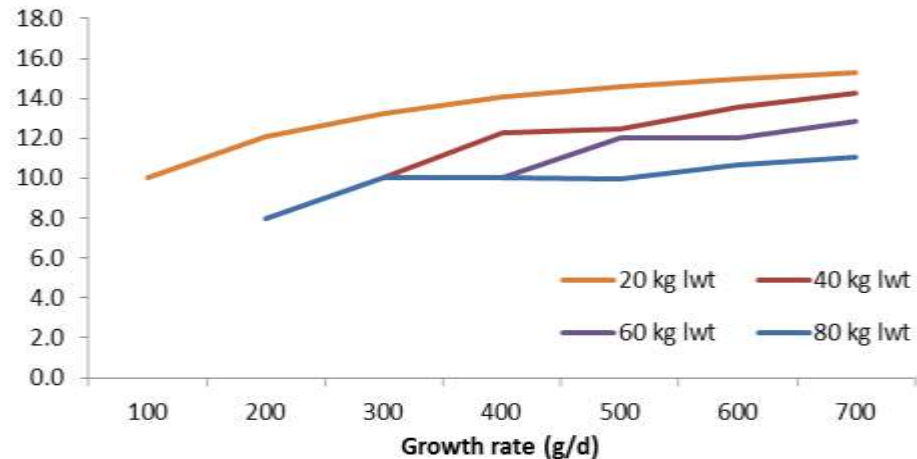


CP%
(kg DM intake)



To achieve higher growth rates, concentrates are required because intake is limited

MJME
(kg DM intake)



Minerals

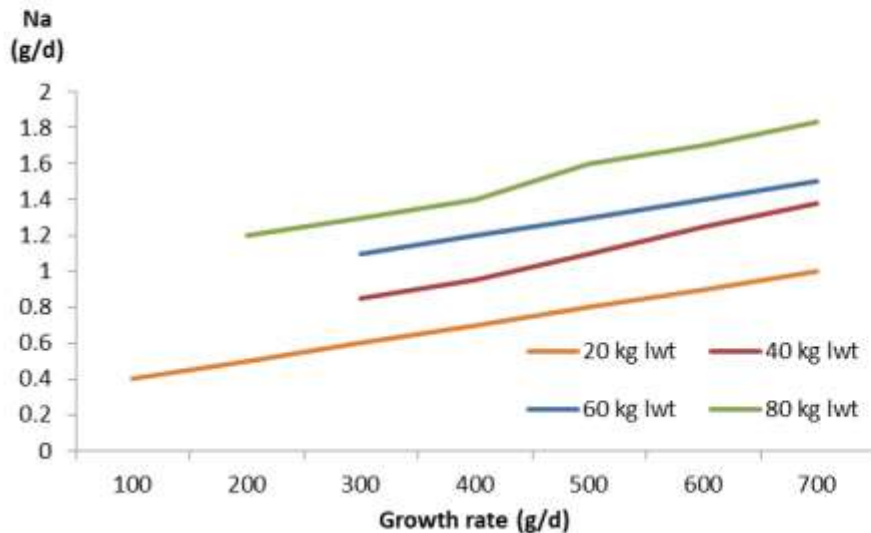
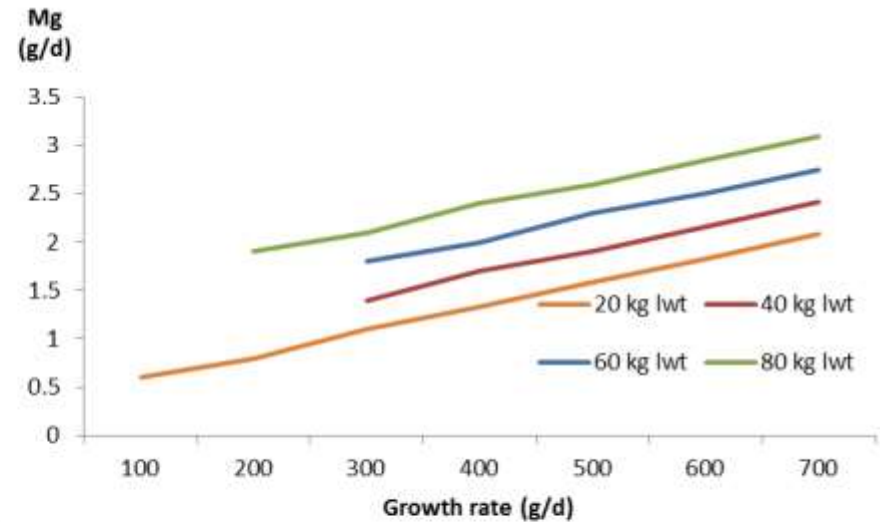
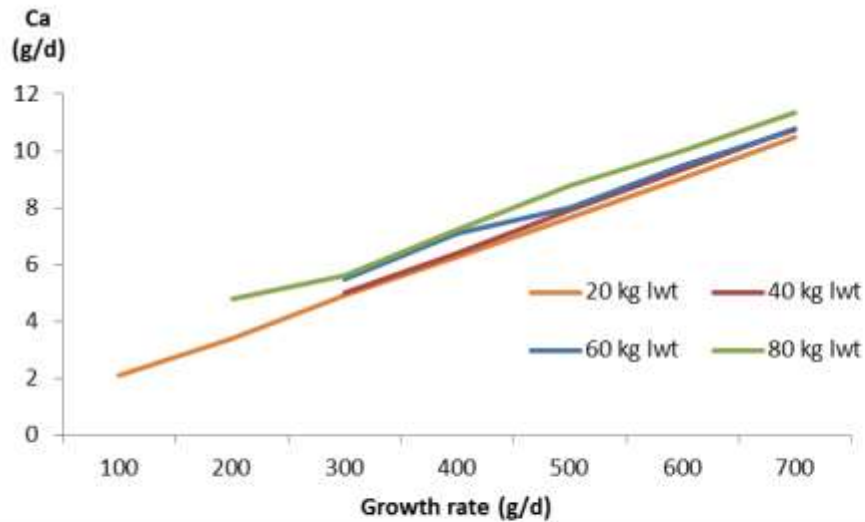
Calcium (Ca)

Magnesium (Mg)

Sodium (Na)

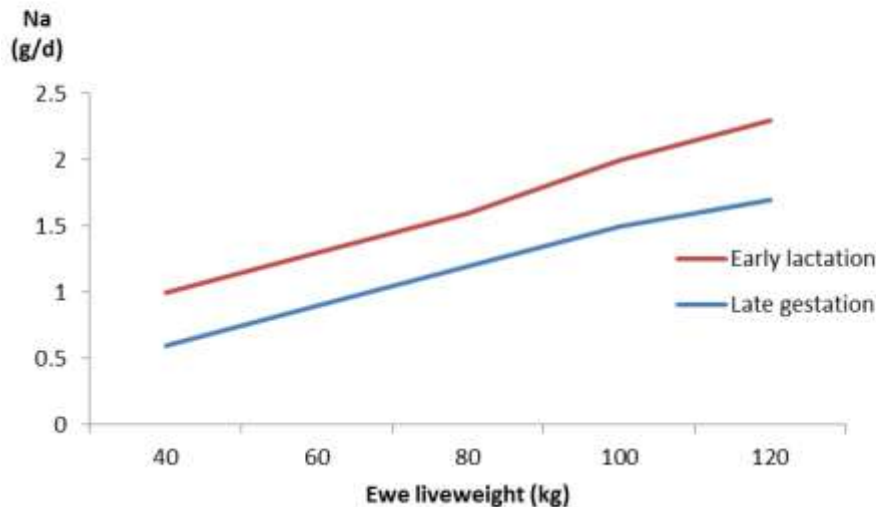
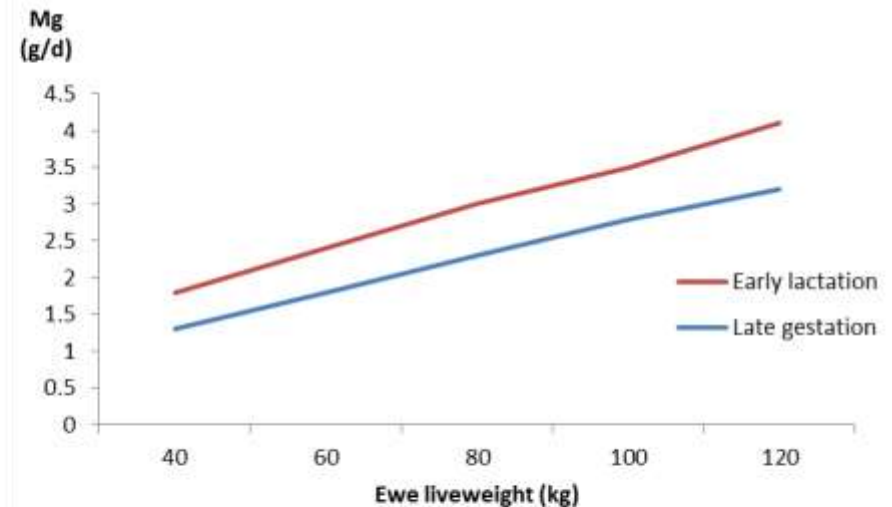
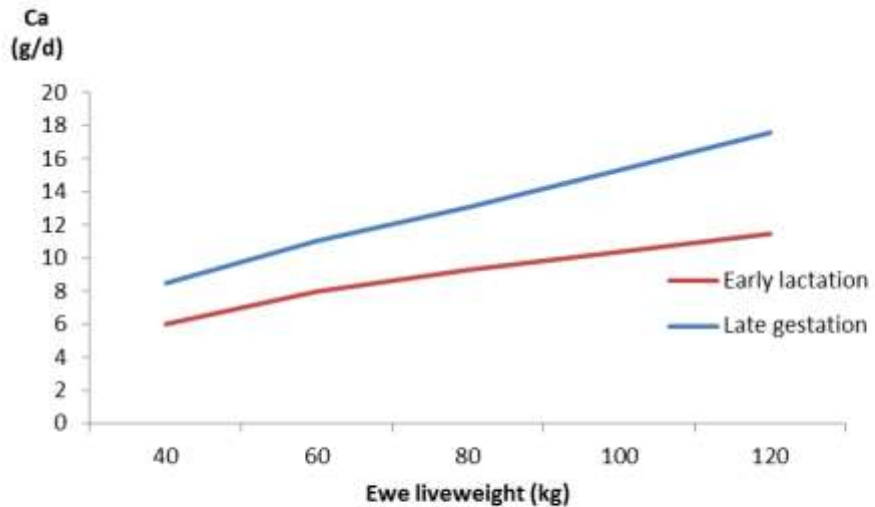


Key minerals – 4 month old lambs



Very little change for mineral concentration in the forage, just the total consumed

Key minerals – Mature, twin-bearing ewes



Again; weight drives requirement – begs the question:

What do commonly used forages provide?

Background – Grazing cereal crops

- ❑ Rapidly adopted technology
 - Initial research focus on growth
 - Low sodium forage; problem of high K:Na ratio = low Mg absorption
 - Add mineral supplement (Causmag & Salt) increased growth
 - Add Causmag = 24-25%
 - Add salt = 18-37%
 - Add Causmag + salt = 31-54%
 - Lime did not provide growth benefit

Background – Grazing cereal crops

❑ Health concerns emerged

- Latest research focused on mineral balance
 - Recommend Lime, Causmag & Salt
 - No additional value using acidifying anions in a lick supplement
 - Vit D not examined
 - Effects of hay not tested
- Little focus on rumen adaptation
 - Excess ammonia & acidosis

Supplementing twin bearing ewes in late pregnancy

Masters et al. 2018
Anim. Prod. Sci.

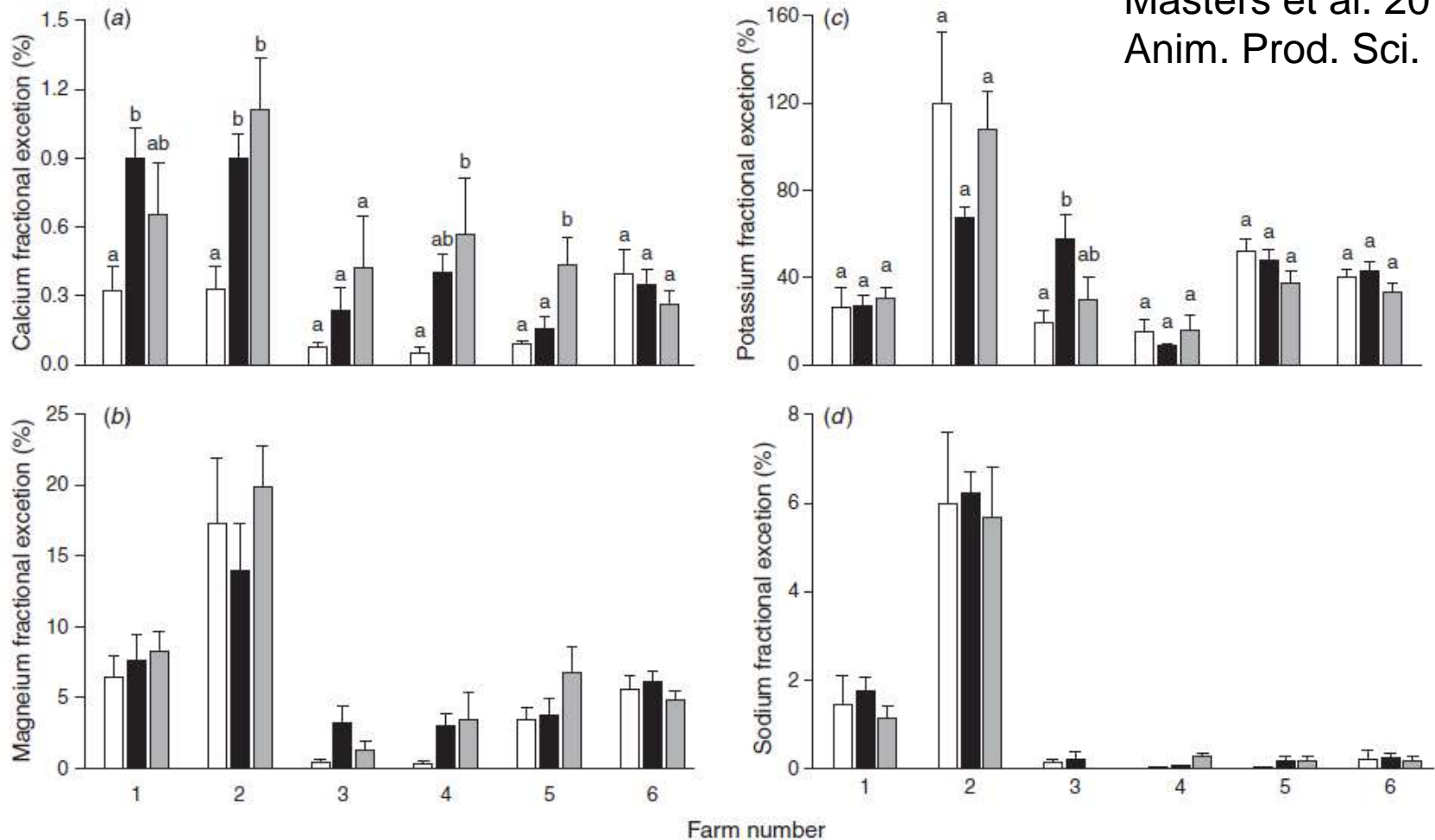


Fig. 2. Mean fractional excretion of (a) Ca, (b) Mg, (c) K and (d) Na on each of six farms from sheep fed no supplement (open bars), the Industry supplement (black bars) and the New supplement (grey bars). Within farms, treatment bars with different letters are significantly different ($P < 0.05$).

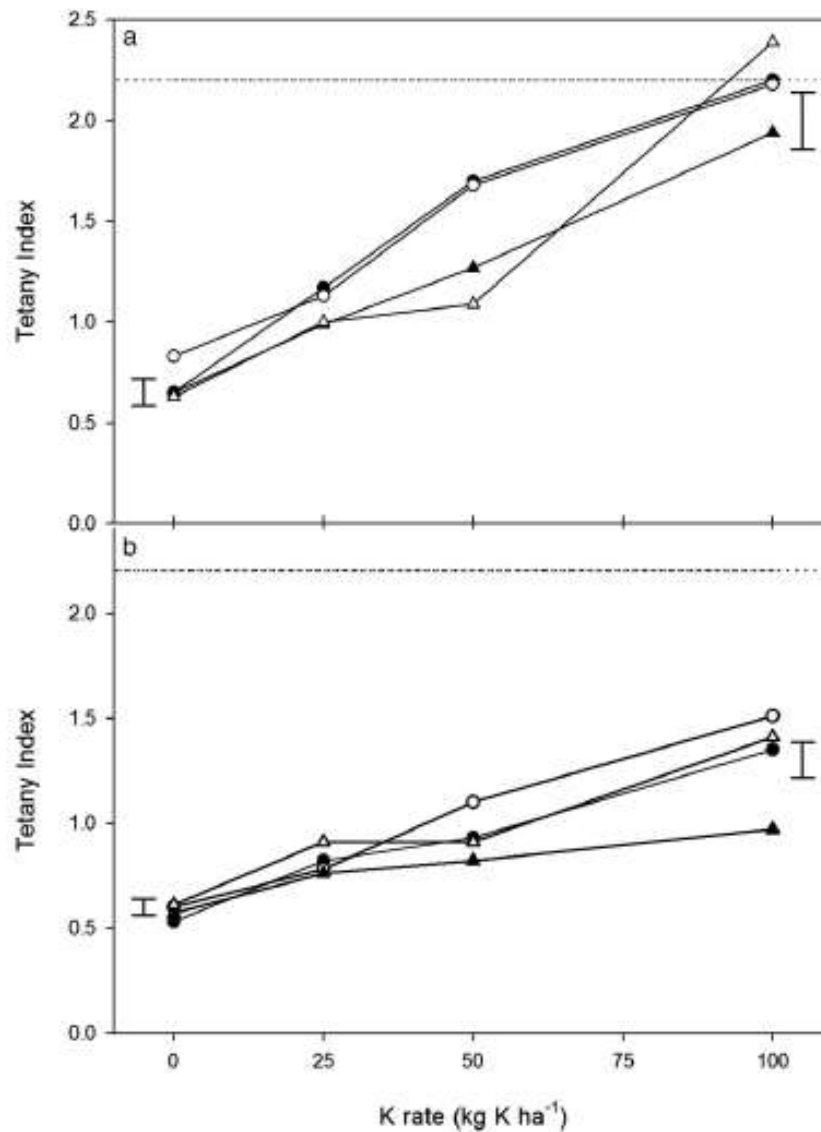
Soil-plant interactions

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

		Forage				Soil			Colwell K
		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	1.00

Masters et al. 2017
Anim. Prod. Sci.

Potassium deficient soils



Holland et al. 2018
NZ J Ag. Res.

Tetany index
 $K / (Ca + Mg)$

Lessons applied to pasture

- ❑ Advice prescribed magnesium supplements on rapidly growing forage
- ❑ Advice advocating low calcium diets in late pregnancy
 - Anecdotal claims for improved weaning & growth rates
 - Implied improved lamb survival

- ❑ Recent trials to examine benefits of Ca, Mg, Na
 - Usual suspect – palatability
 - Ca and Ca+Mg improve health status pre-lambing and immune status
 - Ca supplementation (during lactation) increases twin lamb weight
 - Na supplementation increases liveweight gain on growing lucerne



Requirement twin bearing ewes late pregnancy

	Ca	Mg	P	K	Na	DCAD	Tetany	K:Na+Mg
Requirement	>0.40	>0.09	>0.20	0.5-3.0	>0.09	<12	<2.2	<6.0
Wheat	0.29	0.12	0.39	3.89	0.02	63	4.2	9.5
Oats	0.29	0.12	0.28	3.28	0.03	58	3.4	7.9
Barley	0.40	0.14	0.55	4.29	0.04	34	3.6	8.7
Canola	1.20	0.29	0.22	2.96	0.08	37	1.0	3.4
Mixed pastures Av	0.70	0.25	0.40	2.73	0.42	41	1.5	2.6
Mixed pastures Minimum	0.39	0.13	0.09	0.81	0.02	15	0.4	0.5
Mixed pastures Maximum	1.74	0.50	0.65	5.29	0.94	83	3.2	8.4
Lucerne	1.84	0.27	0.29	2.9	0.03			3.2
Phalaris	0.36	0.16	0.21	3.5	0.26			3.7

Take home messages

- ❑ Questions remain whether Ca supplementation is appropriate in late pregnancy (provide on cereals or very grassy pasture)
- ❑ No early evidence for silver bullets from minerals; on-going research
- ❑ Ca, Mg, Na in lactation increases lamb WWT
- ❑ Pay attention to your local knowledge for mineral deficiencies & only correct deficiencies (limited evidence for supranutritional suppl levels)
- ❑ Align intake with supply (feed budget, preg scan)
- ❑ Seek diverse pastures and forage mixes or commit to supplementation