Mixed Species Annual Fodder Crops Grazing Studies

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Mixed Annual Forage Species

- Project undertaken over 2 years (2023-2024)
- 2 hubs Northern and Southern NSW
- Controlled grazing studies at Glen Innes, and Wagga Wagga
- Producer demonstration sites in southern, central and northern NSW



WWAI Controlled Grazing Study - 2023





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WWAI Study Design - Year 1

- 4 forage treatments:
 - Brassica only (Canola)
 - Brassica + Cereal
 - Brassica + Legume
 - Brassica + Cereal + Legume

Sowing - 2023

Treatments and sowing rates (kg/ha) - 2023								
Treatment	Canola	Radish	Turnip	Wheat	Cereal Rye	Vetch	Arrowleaf	
Pure Brassica	3							
Brassica + Cereal	3	2	0.3	20	5			
Brassica + Legume	3	2	0.3			10	0.5	
Brassica + Cereal + Legume	3	2	0.3	20	5	40	0.5	

\mathbf{N}	Rep 1		Rep 2					
\bigwedge	Plot 2 Brassica Cereal	Plot 4 Brassica	Plot 6 Brassica Legume	Plot 8 Brassica Cereal Legume	Plot 10 Brassica Legume	Plot 12 Brassica Cereal	Plot 14 Brassica	Plot 16 Brassica Cereal Legume
50 m	Plot 1 Brassica Cereal Legume	Plot 3 Brassica Legume	Plot 5 Brassica Cereal	Plot 7 Brassica	Plot 9 Brassica Cereal Legume	Plot 11 Brassica	Plot 13 Brassica Cereal	Plot 15 Brassica Legume





Sheep

- 6 sheep per plot (4 female and 2 males)
- 4 plots per treatment
- 24 sheep per treatment (n = 96 in total)
- Weighed on Day 0, 21 and 35
- Collected rumen fluid and blood from 3 sheep per plot



Temperature and Rainfall - Year 1



Herbage Mass (kg DM/ha) - Year 1



Cereal 📰 Brassica 💷 Legume 💷 Other …•… Total

Quality - Energy (Year 1)



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Quality - Protein (Year 1)



Average Daily Gain - Day 0-21



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Average Daily Gain - Day 0-35



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Rumen pH



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Estimated Methane Output



Minerals - Forage Treatments





Minerals - Supplement Intake



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Minerals - Blood



Mineral Summary

- Calcium may have been lower with mixes compared with Brassica only
- Blood and urine mineral status appeared to be more closely aligned with forage intake rather than supplement
- Forough is preparing a manuscript with mineral data (blood and urine)



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WWAI Study Design - Year 2

- 4 treatments:
 - Cereal only (Wheat)
 - Cereal + Brassica
 - Cereal + Legume
 - Cereal + Brassica + Legume

Sowing

Treatments and sowing rates (kg/ha) - 2024

Treatment	Wheat	Cereal Rye	Canola	Radish	Turnip	Vetch	Arrowleaf
Cereal	80						
Cereal + Brassica	20	5	3	2	0.3		
Cereal + Legume	20	5				40	0.5
Cereal + Brassica + Legume	20	5	3	2	0.3	40	0.5

Ν	⊢−−−− Rep 1−−−−−		Rep 2				Rep 4	
\bigwedge	Plot 2 Cereal Legume	Plot 4 Cereal Brassica	Plot 6 Cereal Brassica Legume	Plot 8 Cereal	Plot 10 Cereal Legume	Plot 12 Cereal Brassica	Plot 14 Cereal Legume	Plot 16 Cereal
	Plot 1	Plot 3	Plot 5	Plot 7	Plot 9	Plot 11	Plot 13	Plot 15
50 m	Cereal	Cereal Brassica Legume	Cereal Brassica	Cereal Legume	Cereal Brassica Legume	Cereal	Cereal Brassica	Cereal Brassica Legume

50 m



Sheep

- 5 sheep per plot (ewe lambs)
- 4 plots per treatment
- 20 sheep per treatment (n = 80 in total)
- Weighed on Day 0, 21, 35 and 42
- Collected rumen fluid and blood from 10 sheep per treatment



Temperature and Rainfall - Year 2



Herbage Mass (kg DM/ha) - Year 2



Quality - Energy (Year 2)



Quality - Protein (Year 2)



Average Daily Gain - Day 0-42



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Rumen pH



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Herbage Mass (kg DM/ha) - Year 2



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Predicted Methane Output (g/day)



Calculated using VFA %



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Predicted Methane

- The higher predicted methane with C+L was due to changes in rumen fluid VFA
 - Lower Propionate
 - Higher Acetate



Summary

- Weight gain was largely influenced by dry matter on offer
- Blood calcium was higher with canola compared with any mixtures
- Future research should determine whether mineral supplementation is required
- Rumen fermentation may be more efficient when cereals are included in the forage mix

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