

Annual legumes to drive productivity and shrub systems to manage risk



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Mixed farming zone of southern Australia



- Whole-farm stocking rates are the major driver of farm profitability
- Stocking rates are constrained by seasonal nutrient gaps (cost of supplementary feeding)



Mixed farming zone of southern Australia



- Bioeconomic modelling shows that improvements in forage digestibility (energy value)
 - Improves production and profitability from annual systems (Bathgate et al., 2009)
 - Increase profitability more than increasing forage growth rates in perennial systems (Monjardino et al., 2014)

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'Typical' plant improvement pathway



(Dear and Ewing 2008; Ewing 2017)

'Typical' plant improvement pathway



Biomass & agronomic traits

Steps

- 1 Farming system & agro-ecological analysis
- 2 ID key traits
- 3 Germplasm acquisition breeding or collection
- 4 Desktop weed risk assessment
- 5 Seed multiplication
- 6 Small plot scale evaluation
- 7 Evaluation of elite genotypes in target environment

A narrow field selected only on agronomic traits

germplasm

diversity



'Typical' plant improvement pathway – *what are we throwing out?*



(Dear and Ewing 2008; Ewing 2017)

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'Typical' plant improvement pathway – *what are we throwing out?*



(Dear and Ewing 2008; Ewing 2017)

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"Yes – but there is little variation within the major legume species..."

- 35 lucerne genotypes, second cut after sowing;
 - No differences in biomass
 - Significant differences in digestibility, protein and fibre (9.3 -10.8 MJ ME/kg DM)
 - 3-fold difference in predicted weight gain of lambs (predicted using GrazFeed, Freer et al., 1997)



Are we identifying and selecting the best forages to allow livestock to meet genetical potential?



Norman et al., 2013

Dryland Legume Pasture Systems Project











Australian Government Department of Agriculture, Water and the Environment



Australian Wool Innovation Limited









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Department of **Primary Industries**





MEAT & LIVESTOCK AUSTRALIA

MURDOCH

PERTH, WESTERN AUSTRALIA









"5% (unit) increase in dry matter digestibility is equivalent to 1000kg/ha of biomass"



DLPS, Thomas et al. (2021)







Digestibility of 5 annual legumes at Brookton

Dry matter digestibility (%)



Filling the gap in autumn – the case for saltbush







Filling the gap in autumn – the case for saltbush



- 1 kg of biomass in autumn has 10x the value of 1 kg in spring
- Saltbush persists in saline AND non-saline soils and is drought tolerant
- Digestibility of saltbush was a major challenge
- Bioeconomic modelling improving digestibility key trait



In 2006, oldman saltbush collected across Australia (27 provenances)



Planted at Tammin, Monarto and Condobolin - 20 000 shrubs per site





Provenance

Organic matter digestibility (%)

Measured sheep preferences between provenances grown at 3 locations



What did the sheep tell us?



- Provenance level preferred subspecies with higher digestibility & lower salt
- Amongst the 90 best genotypes also preferred higher N & lower S (balanced N:S)
- Amongst the best 12 genotypes— they are still consistently selecting for something...

Anameka[™] saltbush released in 2015, > 3million planted



Compared to the mean of the collection...

- 15% units higher digestibility (OMD 64%) & higher voluntary intake
- 8x more 'edible' biomass
- Easy to propagate, establish and persistent
- >2 million shrubs planted by over 200 farmers





Make saltbush systems work for you...

- Understand your motivations
- Site capability salt & waterlogging
- Don't forget an understorey
- Design layout and density (700-1000 shrubs/ha)
- Sheep need more water as fresh as possible



Make saltbush systems work for you...

- Saltbush has pp to 25% salt in leaves
- Moderate digestibility & crude protein
- 1/3 saltbush with 2/3 something else
- Energy supplements for reproducing & young stock



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- Energy supplements for reproducing & young stock
- 25% increase in wool growth
- Vitamin E
- Minerals occur in excess within halophytes
 - Positives Se, Zn, S, Cu accumulation
 - Negatives -Sheep grazing saltbush lose Ca, Mg and P (although sufficient in diet).
 - Induced Cu deficiency?
 - Oxalates can bind Ca in the rumen



Whats next?

No More Gaps Saltbush Project

Oldman saltbush grows well without salt



DLPS & Transformational Feedbase





















Department of Primary Industries



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MORe – Microclimates for Ovine Reproduction

1. Heat stress and reproduction















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2. Design, establishment and benefits of edible shelter to improve lamb survival and whole-farm profitability



Tammin farmer Rodney Stokes in his Anameka[™] plantation Photo credit: Australian Wool Innovation

Thank you

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