

Does it pay to reduce *Acacia karroo* (*Vachellia karroo*) trees?

A cost-benefit standoff (research provide answers)

C. H. De Ridder
&
Prof. E.. E. Campbell



Introduction and background

Objective A

- The effect of tree density on grass production
- The effect of tree density on grass quality
- The practical implications of these effects, if any

Objective B

- Establish if density differences is consistent throughout the different rainfall regimes and areas

Measurements

1. Tree density
2. Grass production
3. Grass quality
4. Grass species composition
5. Effect on plant chlorophyll content
6. Shade effect
7. Tree canopy effect
8. Effect on soil temperature
9. Effect on soil quality

Variable research

Positive impact

- Yield increase under canopies (Stuart-Hill 1987)
- Remove trees low densities, reduced yield (Stuart-Hill 1987)
- Legumes increase yield (Clarkson 1987)
- Legume mixed pasture – increase CP levels (Sengul 2003)
- Low tree densities increased yield compared to no trees (Hobson 1993)
- Grasses more selected, Higher % CP and green under leguminous trees (Cerqueira 2004)
- Animals grazed more under trees compared to open areas (Treydte 2010)

Farm Euphorbia (2002)

- Average and low densities - increased grass yield
- Biomass - higher % palatable species
- Animal concentration amongst trees
- Animals - biased towards palatable species

Farm Campagna (2005)

- Grass yield - not significant impacted by trees

Pre-trial situation

- The Scientific data available is from a small area
- The data is contradictory
- The farmers react without sound information
- No specific action is taken (no direction)
- Trees are continually encroaching
- Cost of control is high

Various sites (rainfall)

- Cradock (200-400 mm)
- Adelaide (400-600 mm)
- Cathcart (400-600 mm)
- Kubusi drift (600-800 mm)
- Kei Mouth (800-1000 mm)

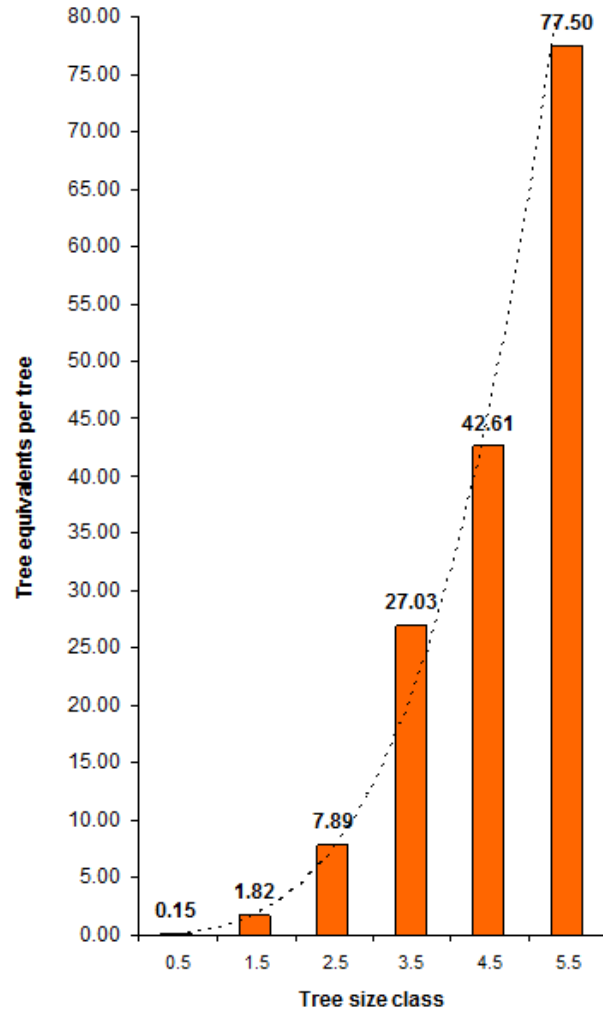


Results

- **Tree density**
- **Rainfall (dry/wet)**
- **Grass production influenced (tree density)**
- **Crude protein % (site)**
- **Tree density influence (CP %)**
- **Season influence (CP %)**

Tree Density (TE/Ha)

Average tree equivalents per tree for various tree size classes



Trees to area at 10 000 TE/Ha

- At 1.5 m. tree size = 1 tree per 1.82 m² (5 495 trees)
- At 3.5 m. tree size = 1 tree per 27.03 m² (370 trees)
- At 5.5 m. tree size = 1 tree per 77.50 m² (129 trees)

Practical value determination (to agriculture and the farmer)

Pasture value determination

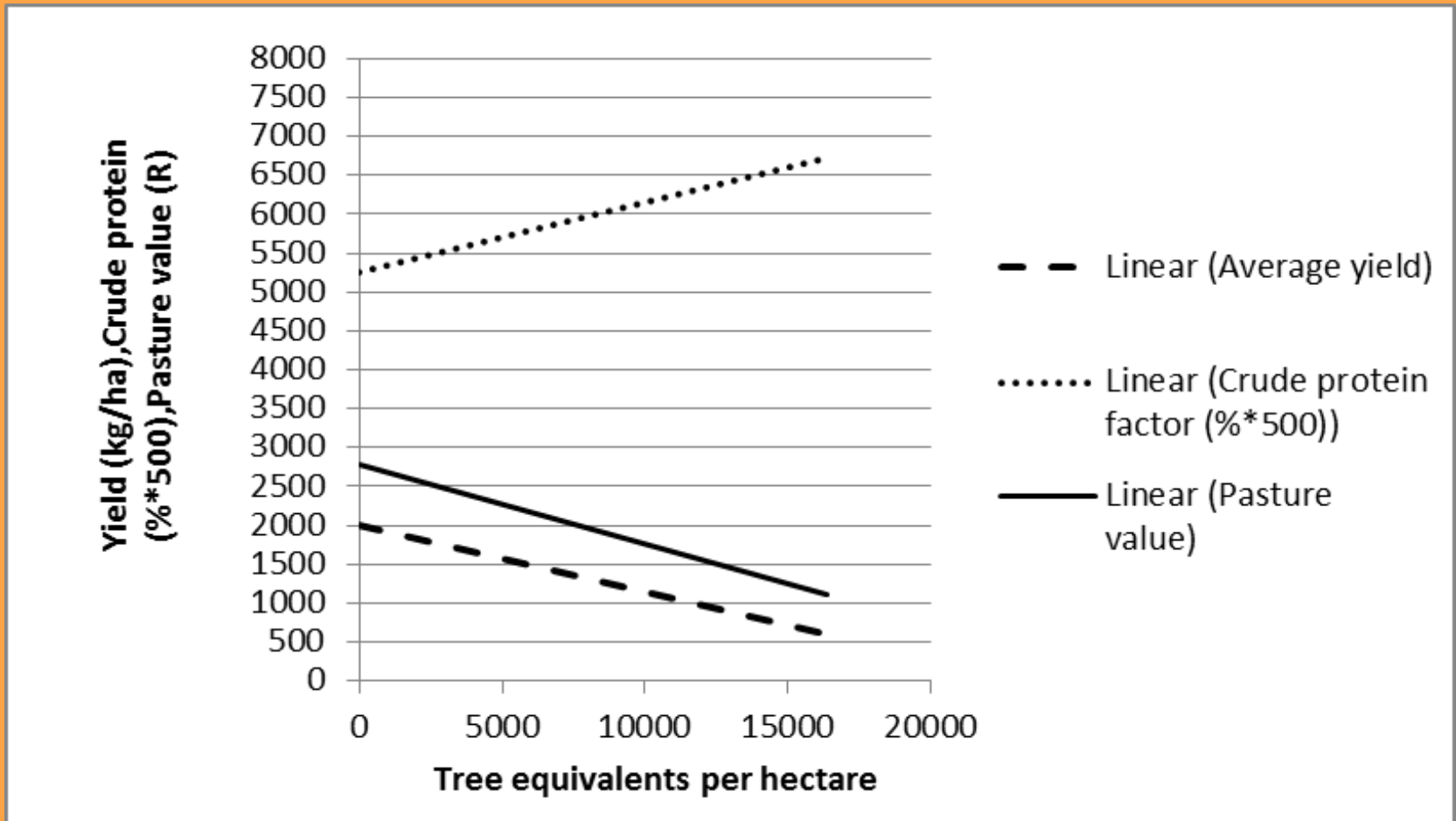
Lucerne = 25 Kg. @ AVG 15% CP @ cost of R50.00

Cost per unit CP = Value R13.33

Value per Ha = ((CP%/100) x Production per Ha) x Value factor

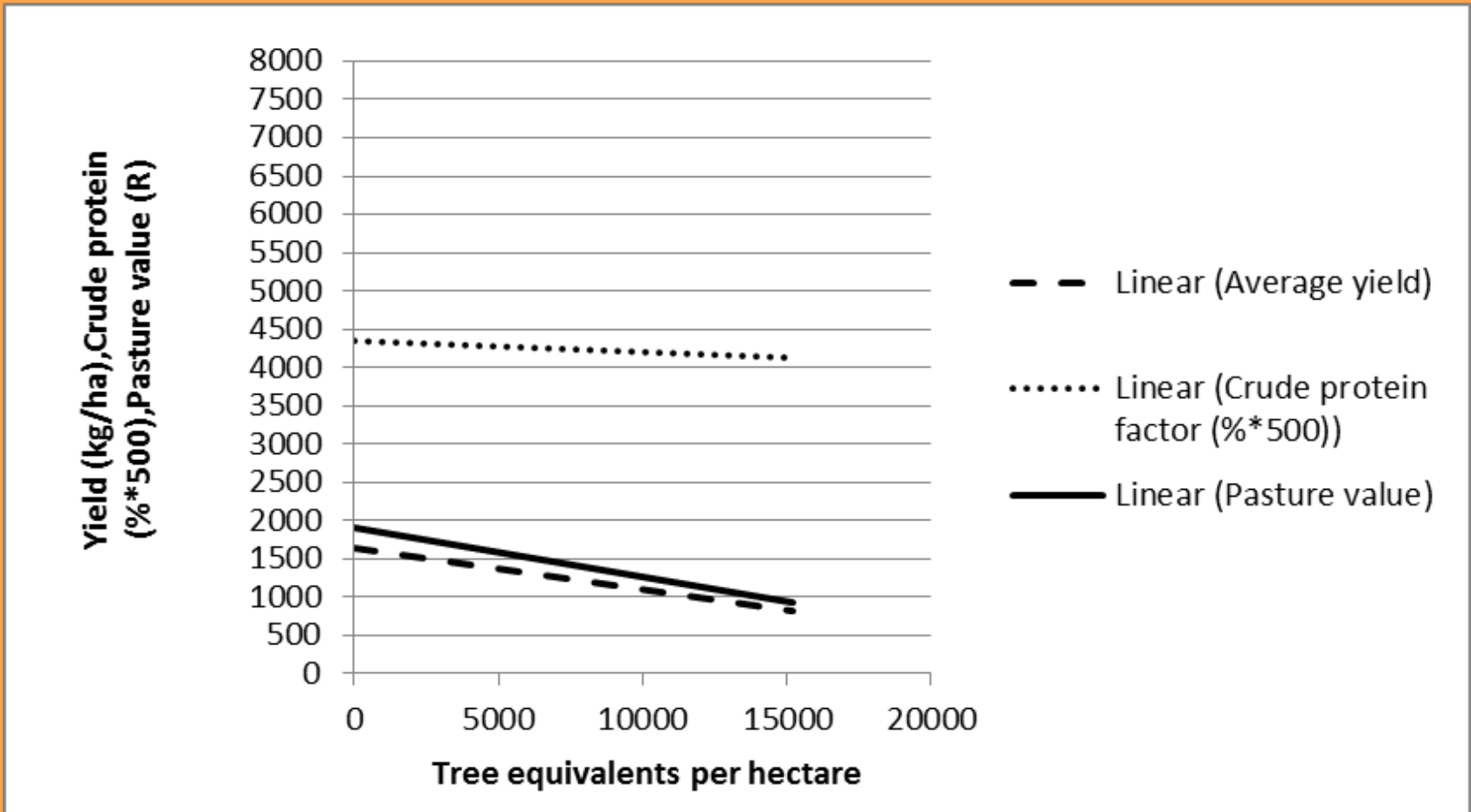
Prediction low rainfall areas

- **Cradock data**
- **Predicted impacts for low rainfall areas < 400 mm**



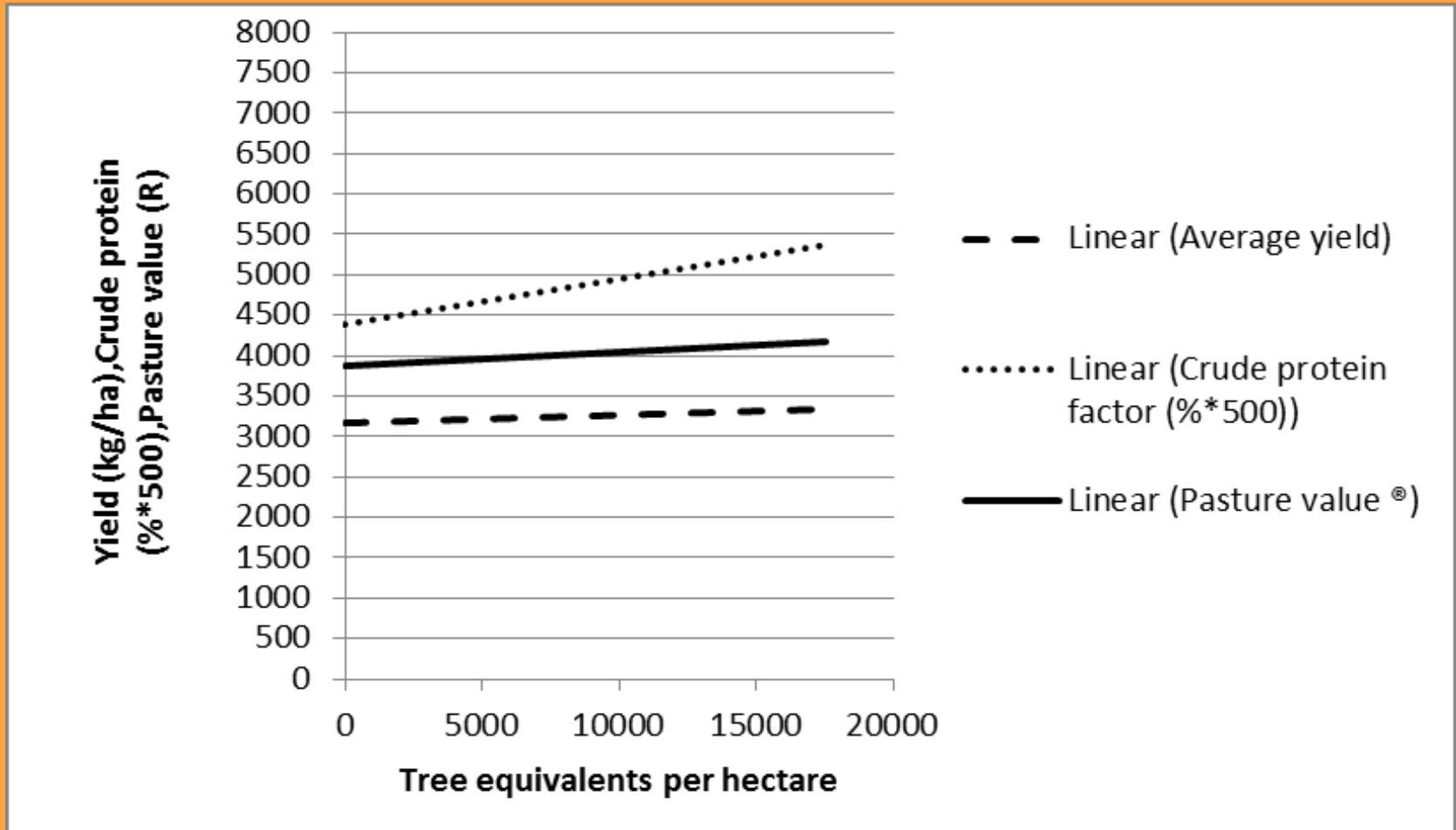
Prediction medium-low rainfall areas

- **Adelaide/Cathcart data**
- **Predicted impacts for medium-low rainfall areas < 400-600 mm**



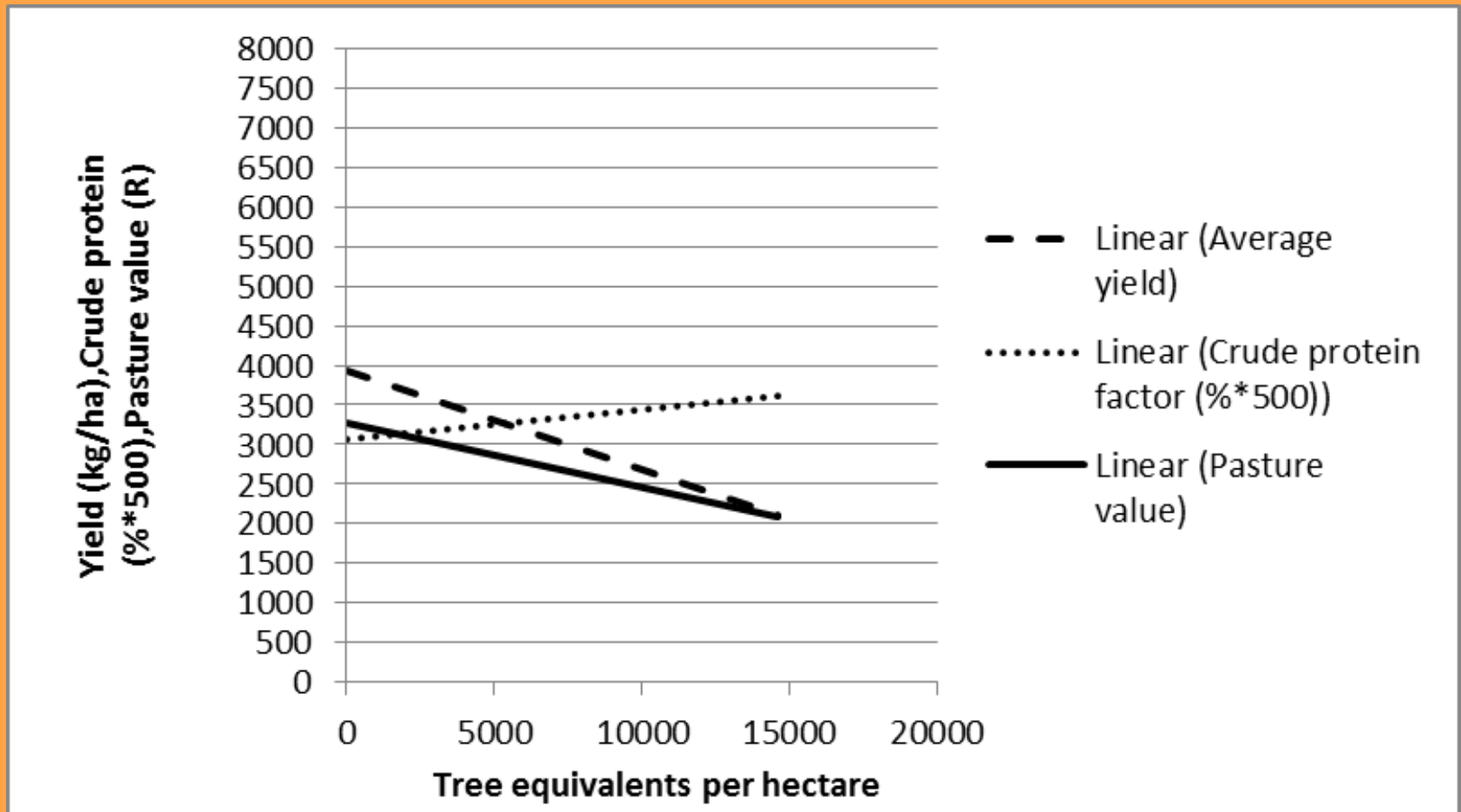
Prediction medium-high rainfall areas

- **Kubusi Drift data**
- **Predicted impacts for medium-high rainfall areas < 600-800 mm**



Prediction high rainfall areas

- Kei Mouth data
- Predicted impacts for high rainfall areas > 800 mm



In Summary

Site	Tree reduction (TE)	Cost of removal per ha (R)	Value gain per ha (R)	Cost value difference (R)	Time period (viability)
Cradock	5000-3000	700	250	- 450	2.8
	10000-3000	2450	750	- 1700	3.3
	15000-3000	4200	1250	- 2950	3.4
Adelaide/	5000-3000	700	250	- 2000	2.8
Cathcart	10000-3000	2450	500	- 1950	4.9
	15000-3000	4200	750	- 3450	5.6
Kei Mouth	5000-3000	700	200	- 500	3.5
	10000-3000	2450	500	- 1950	4.9
	15000-3000	4200	900	-3300	4.7



Viability factor impacted

- Existing tree development
- New tree infestation rate

Maintenance cost



Justification of *Acacia karroo* tree removal

Justification test

- Removal cost compared to value gained will determine the economic viability
- As a once off cost/value gain comparison, may be the case (not economically viable)
- Viability will further be influenced by re-encroachment time period

Post-trial situation

- Scientific data available from a range of rainfall areas
- Area specific yield influences (rainfall/tree density)
- Area specific crude protein influences
- Practical pasture value determined per area
- Practical data to support decision making

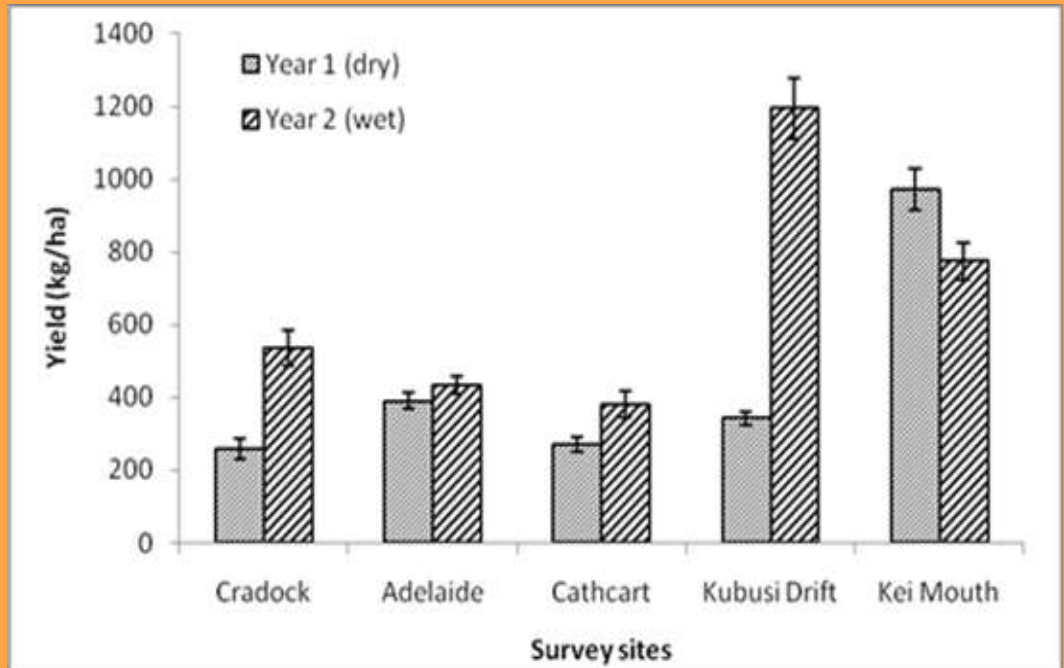
C H De Ridder
Cell: 0828216995



The end
Thank You

Results

- Tree density
- Rainfall
- Grass production



Results

- Crude protein % (site)
- Tree density impact CP %
- Season impact CP %

