



FUTURE FARM
INDUSTRIES CRC

HERITABLE RESPONSIBILITY FOR AUSTRALIAN LANDSCAPES

Farming Systems with Lucerne are more Profitable, Sustainable and Resilient than Current Systems

Diana Fedorenko and Perry Dolling
Pastures Program, DAFWA



Department of
Agriculture and Food



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Paths to Adoption Workshop
Katanning WA
24-25 October 2007*



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Whole-system fit?

Prevent natural resource degradation by
managing recharge
to control dryland salinity and waterlogging,
prevent loss of remnant native vegetation
protect biodiversity



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Whole-system fit?

Open more opportunities for livestock production by
producing out-of-season pasture



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Whole-system fit?

Enhance crop production by
improving soil fertility and structure,
decreasing weed burdens
and increasing options to manage
herbicide resistant weeds

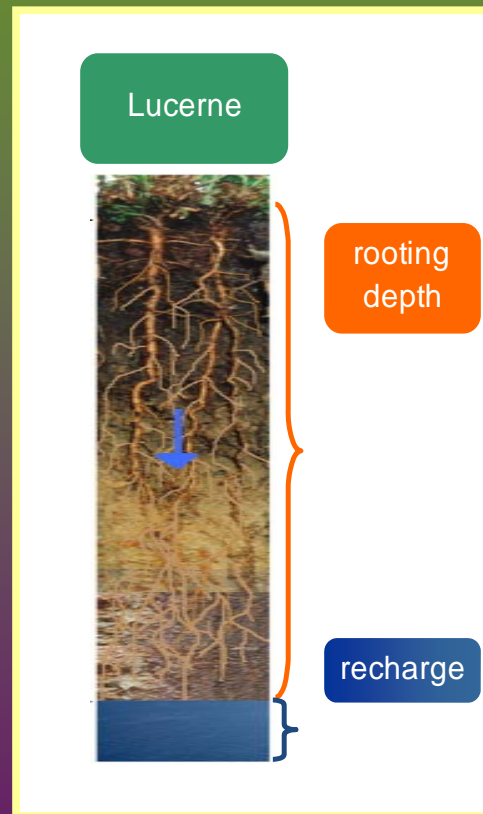


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RESTORABLE PERENNIALS FOR AUSTRALIAN LANDSCAPES

Likely to deliver?

- ✓ Perennial
- ✓ Deep roots
- ✓ Vegetative
- ✓ ↑ Water use



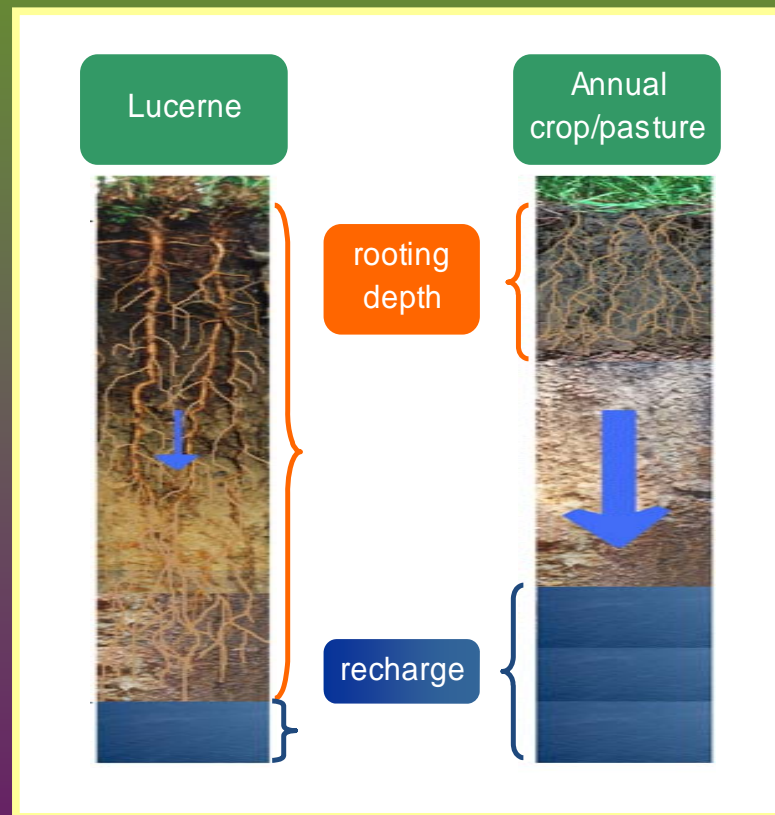


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Compared with current system?

- ✓ Perennial
- ✓ Deep roots
- ✓ Vegetative
- ✓ ↑ Water use



- ✓ Annual
- ✓ Shallow roots
- ✓ Seed
- ✓ ↓ Water use



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RESTORABLE FERTILITY FOR AUSTRALIAN LANDSCAPES

Lucerne Uses More Water Than Annuals

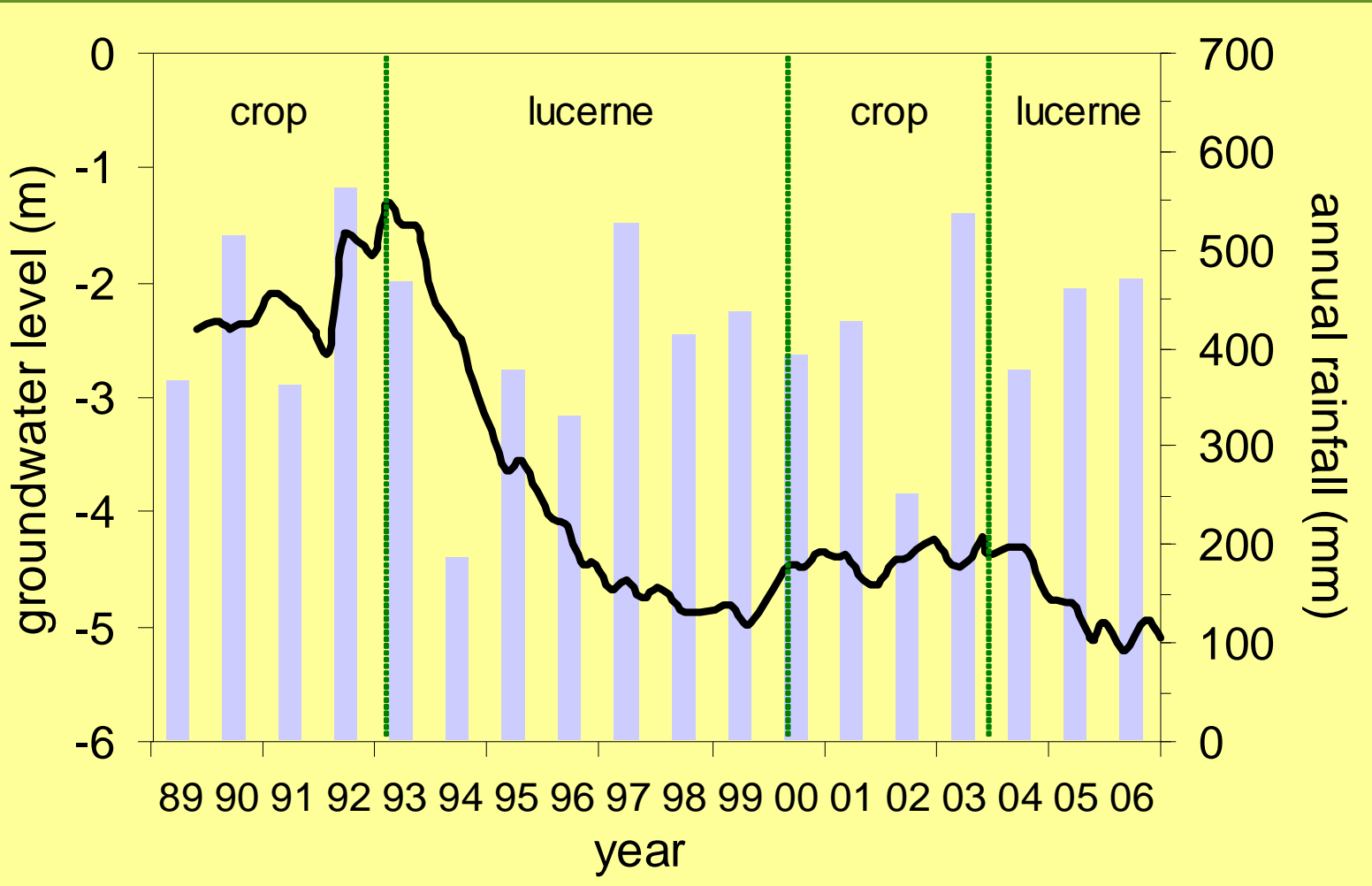
Location	Region	AAR (mm)	Dry soil buffer (Luc-Ann) (2 years after sowing lucerne)
Meckering	C	325	50
Wongan Hills	C	362	104
Quairading	C	373	61
Corrigin	C	375	24
Moora	C	462	50
Newdegate	SC	352	81
Wittenoom Hills	SC	387	42
Borden	SC	388	74
Cascade	SC	396	39
Jerramungup	SC	429	55
Katanning	SW	488	60

Sources: Latta *et al.* (2001, 2002), Ward *et al.* (2001, 2002), Tennant *et al.* (2003), Fedorenko *et al.* (2004), Dolling *et al.* (2005), Fillery & Poulter (2006), Latta & Lyons (2006), Ward *et al.* (2006)



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Lucerne Lowers the Watertable



Source: Ferdowsian and Bee 2007



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Lucerne Can Produce Dry Matter All Year Around

APSIM Modelling (average 1955-2005)

Location	Region	AAR (mm)	Seasonal dry matter production (t/ha)				Total production (t/ha/yr)	AAR over summer (%)
			winter	spring	summer	autumn		
Mingenew	N	405	1.7-1.9	2.0-2.7	0.2-0.3	0.4-0.6	4.3-5.5	8
Cunderdin	C	377	1.3-1.4	1.9-2.8	0.2-0.4	0.6-0.8	4.0-5.4	13
Kojonup	SW	510	1.0-1.1	3.3-4.2	0.7-1.1	0.6-0.8	5.6-7.2	9
Jerramungup	SC	453	1.2	3.6	1.2	0.9	6.9	16
Borden	SC	388	1.0	4.4	1.0	0.9	7.3	14

Source: P Dolling *unpublished data*



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Lucerne Can Produce Forage During the Summer-Autumn Feed Gap

APSIM Modelling (average 1955-2005)

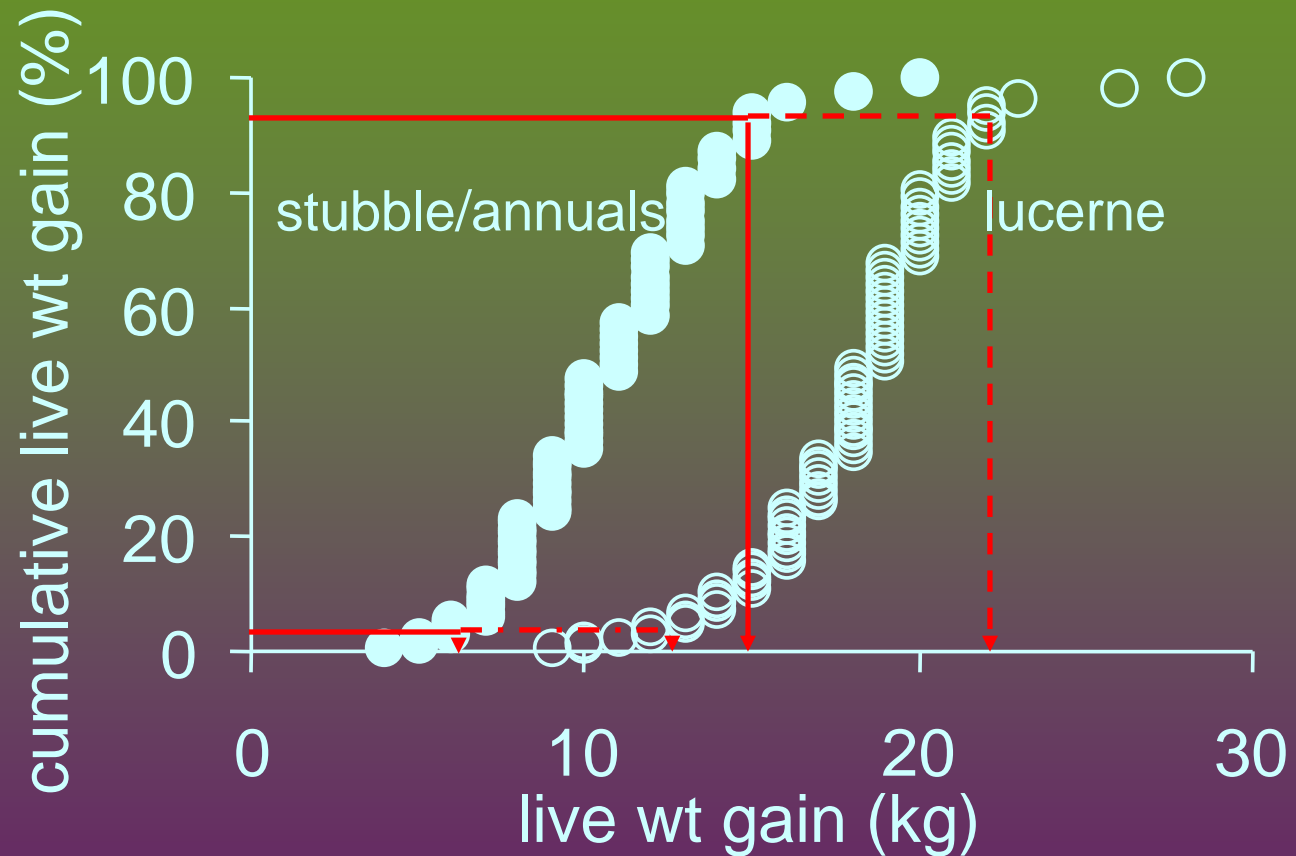
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Lucerne Can Boost Livestock Production (summer-autumn)



D Fedorenko & R Beard 2003



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More Grain Yield and Protein in Most Seasons with Lucerne

Location	Region	Year	Rainfall in cropping year in relation to AAR	Annual system (AAWW)		Lucerne system (LLWW)	
				Yield (t/ha)	Protein (%)	Yield (t/ha)	Protein (%)
Borden	SC	1998	Above	4.0	9.3	4.7	9.3
Pingrup	SC	1998	Below	2.0	12.0	2.1	13.3
Cascade	SC	2000	Below	1.2	-	1.1	-
		2001	Above	2.9	8.5	3.7	9.8
Wittenoom Hills	SC	2000	Below	0.9	8.6	1.4	11.9
		2001	Above	1.8	8.8	2.5	10.0
Quairading	C	2000	Below	0.7	15.1	0.5	13.5
		2001	Above	1.3	11.8	1.3	11.6
N Meckering /Cunderdin	C	2004	Below	2.6	11.9	2.0	11.5
	C	2005	Below	1.7	12.1	2.0	12.1

Latta et al. (2001), Latta and Lyons (2006), Fedorenko et al. (2005), D Fedorenko unpublished data



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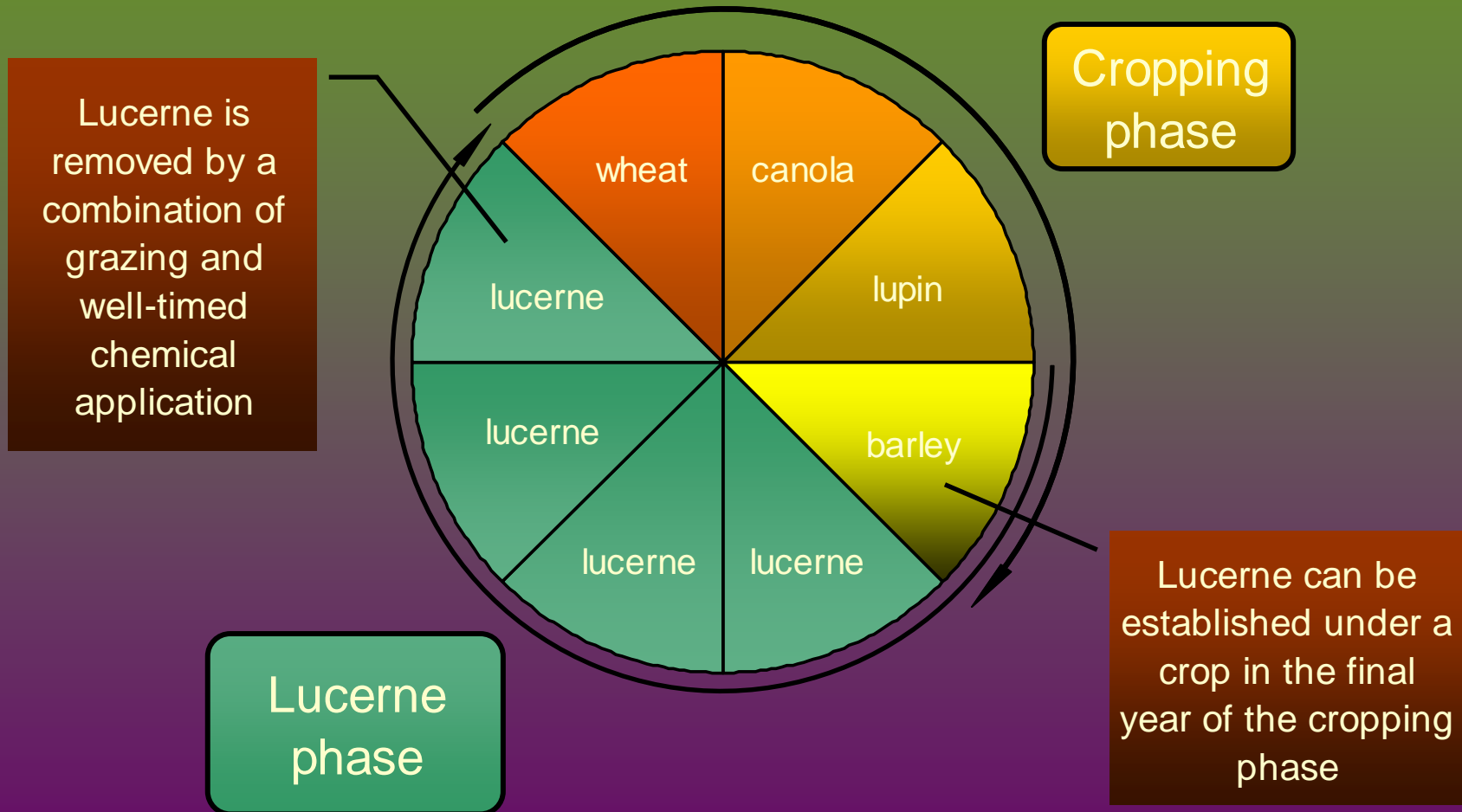
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Phase Farming with Lucerne





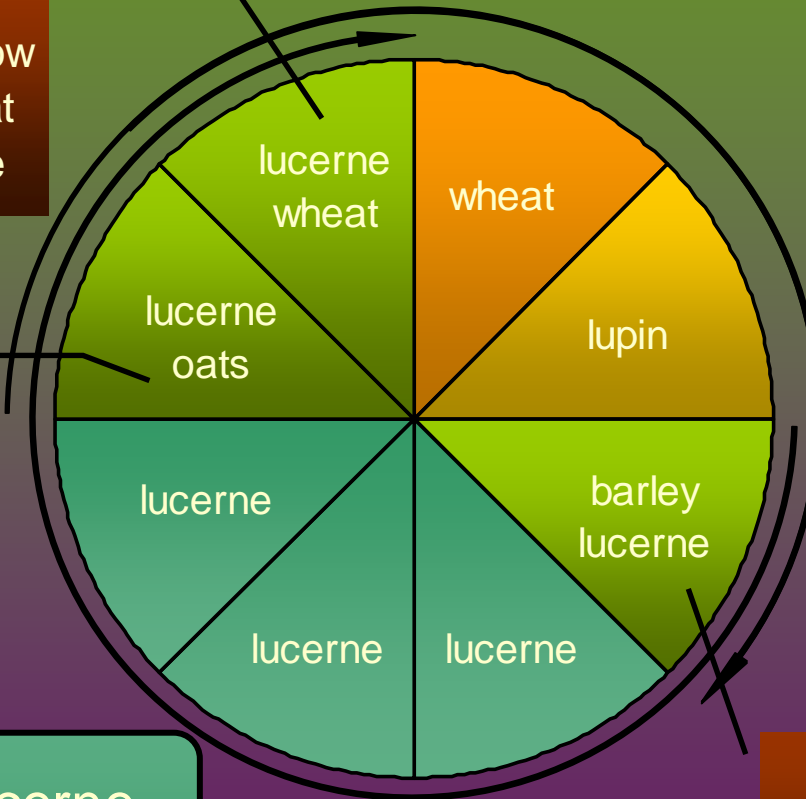
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Companion Cropping with Lucerne

"Phasing OUT"
crops are sown over low
densities of lucerne at
the end of the phase

Opportunistic year
to bulk lucerne for
forage or hay
production

Lucerne
phase



Cropping
phase

"Phasing IN"
lucerne is established
with a companion crop



Transition costs - Wickepin

- AAR = 383 mm
- Lucerne: 1/3 of farm
- Systems compared:

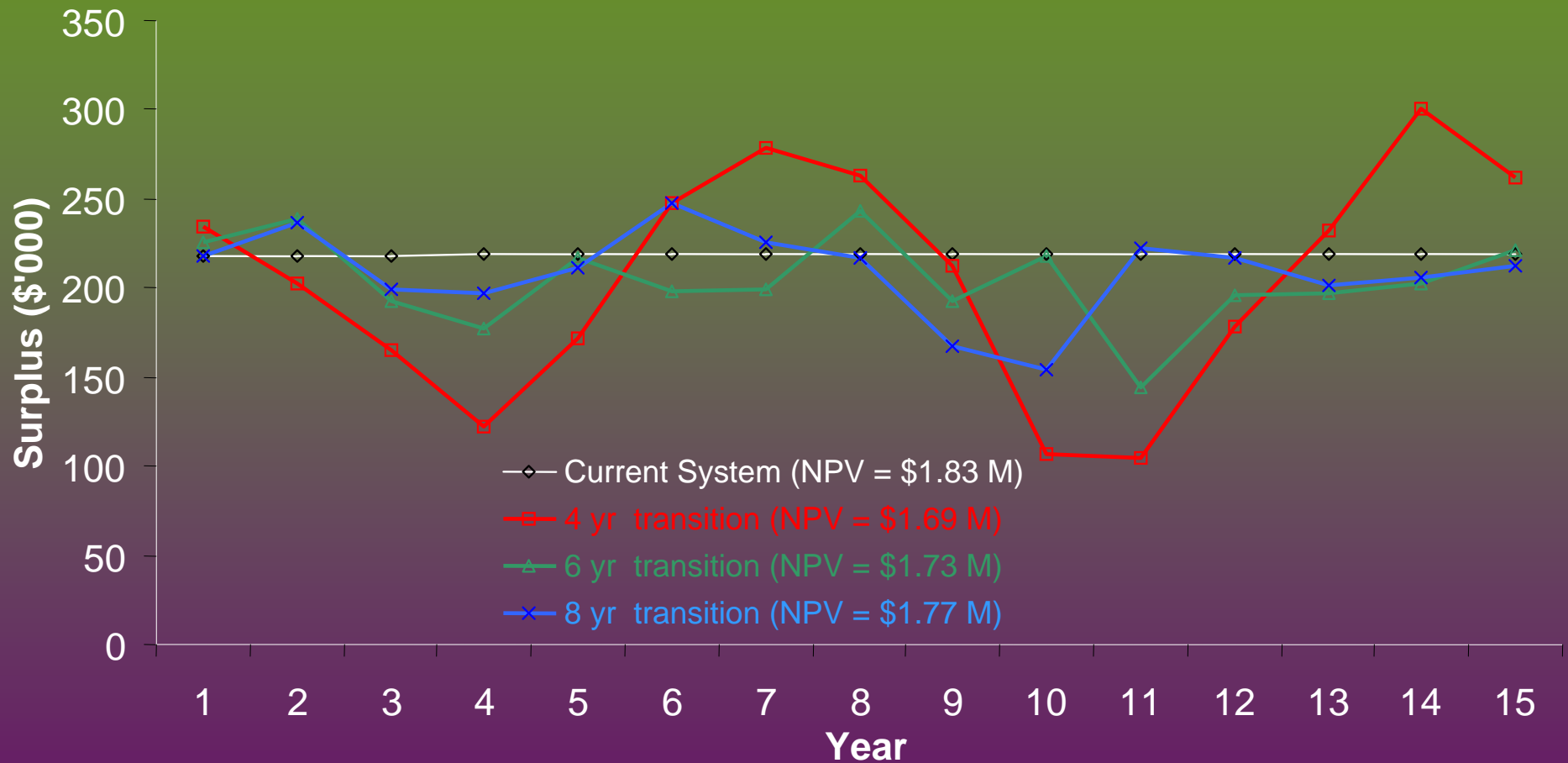
Annuals only	W	P	W	P	W	P	W
Annuals + perennials	L/B	L	L	W	C	W	B

- 3 transition periods (4, 6 and 8 years)
- 15 year simulation



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Transition Period and Income Distribution



A Bennett unpublished data



Loss of income from encroachment of salinity

- losing profitability of the current system by making the transition too quickly

Production penalty	4 year transition	6 year transition	8 year transition	No transition
No penalty	\$1.68 M	\$1.73 M	\$1.77 M	\$1.83 M
1% penalty	\$1.68 M	\$1.71 M	\$1.70 M	\$1.68 M
3% penalty	\$1.66 M	\$1.68 M	\$1.65 M	\$1.38 M
5% penalty	\$1.65 M	\$1.65 M	\$1.60 M	\$1.09 M

A Bennett unpublished data



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Other Interactions Yet To Be Considered

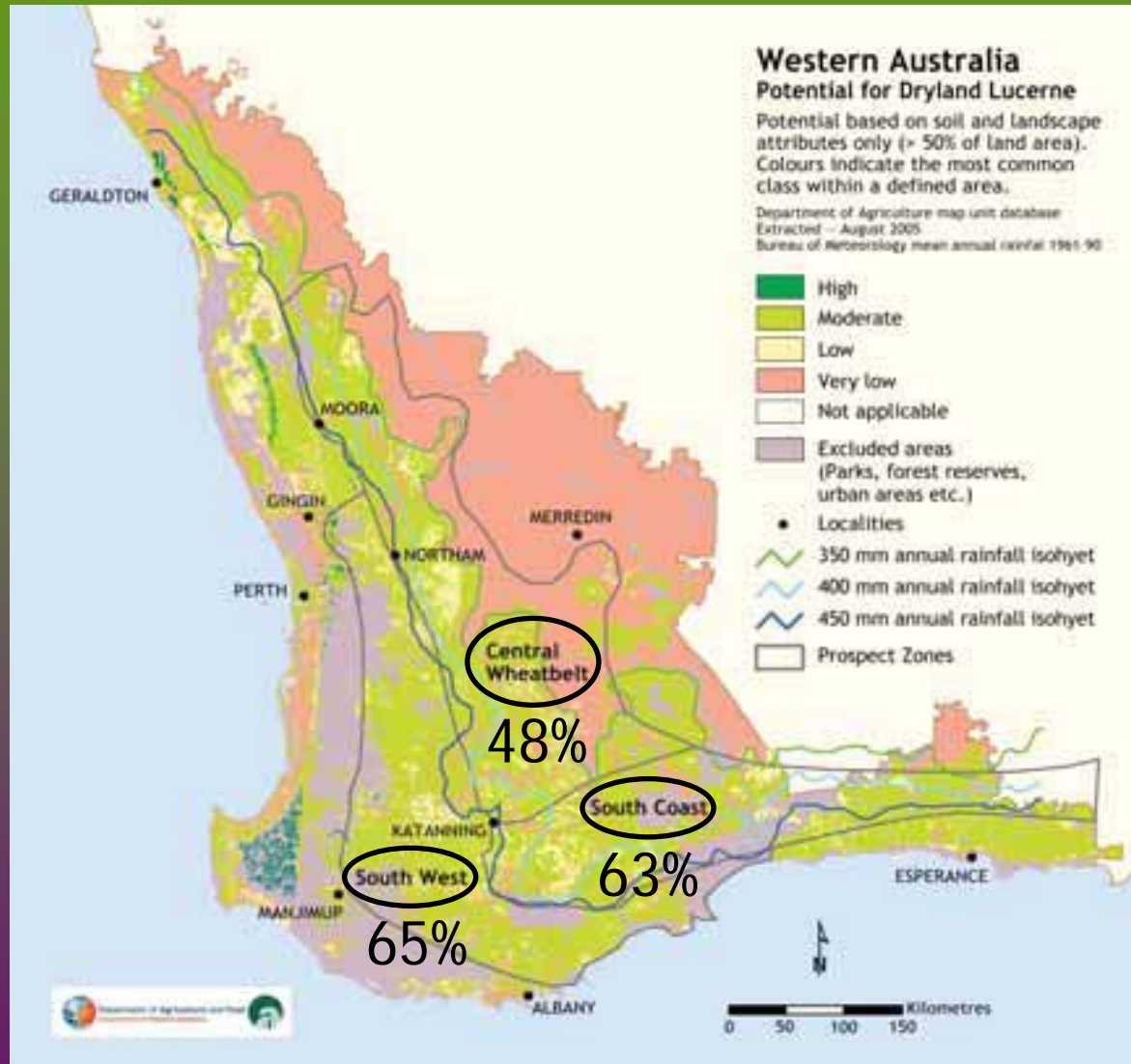
- ✓ Changes in sheep reproductive rate
- ✓ Improved wool quality
- ✓ Increased price of sheep grazing lucerne
- ✓ Increased stocking rates
- ✓ Decreased yields in following crops from soil water deficiencies
- ✓ Improved weed management
- ✓ Soil health benefits such as improved soil structure and stability



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Where to grow lucerne?





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The Decision

- investing now in learning and getting up and running the new system with lucerne (“losing profitability of the current system”)
- recovering the investment by:
 - a) preventing or stopping natural resource degradation (soil, water, native fauna and flora)
 - b) getting the most of out of lucerne via grazing
 - c) increasing plant diversity to manage risk