Recent developments in dual-purpose canola

John Kirkegaard, S Sprague , H. Dove, J Lilley, L Bell, M Seymour, J McCormick
J Hunt, P Hamblin

SUSTAINABLE AGRICULTURE FLAGSHIP
www.csiro.au

GRDC Grains Research & Development Corporation
Your GRDC working with you

kalyx

CSIRO

Background – Why?

- Reduce risk of canola (millenium drought)
- Manage weeds and disease in HRZ cereals
- Highly profitable alone, and for system

How?

2004-06	CSIRO Pilot studies (Canberra)
2007-09	GRDC Best-Bet Management (main wheat-belt)
2009-12	GRDC Integration in the HRZ (canola and wheat)
2013-15	GRDC Refining grazing management
	[Grain and Graze I, II, III]

Matching crop phenology to site and season

TABLELANDS/HRZ/IRRIGATION: Winter types

SLOPES: Grain/Graze - Early sowing of Late Spring types

WHEAT BELT: - Clip-grazing - Normal window Spring types

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

First commercial crop grazed at Bobbara Station, NSW in 2007

Best Bet management guidelines

- Select a suitable paddock planned for canola. Good moisture.

- Sow 2-3 weeks earlier than normal – be prepared

- Variety - appropriate phenology for the site/sowing time
  - good blackleg resistance, high vigour
  - weed control - early sowing and **chemical withholding periods**

- Commence grazing when plants are well anchored and there is adequate biomass (~1.5 t/ha) usually 6-8 leaves; mid-late June.

- Lock-up before buds elongate >10 cm, to avoid yield loss. If later, graze moderately to remove leaf. Bud removal delays flowering.

- Expect 600-800 DSE grazing days/ha (4-6 weeks @25 dse/ha)

- Consider top-dressing N after grazing if rainfall is forecast

Success in a range of environments

Peter Watt, Elders Cowra (15 growers, 2008)

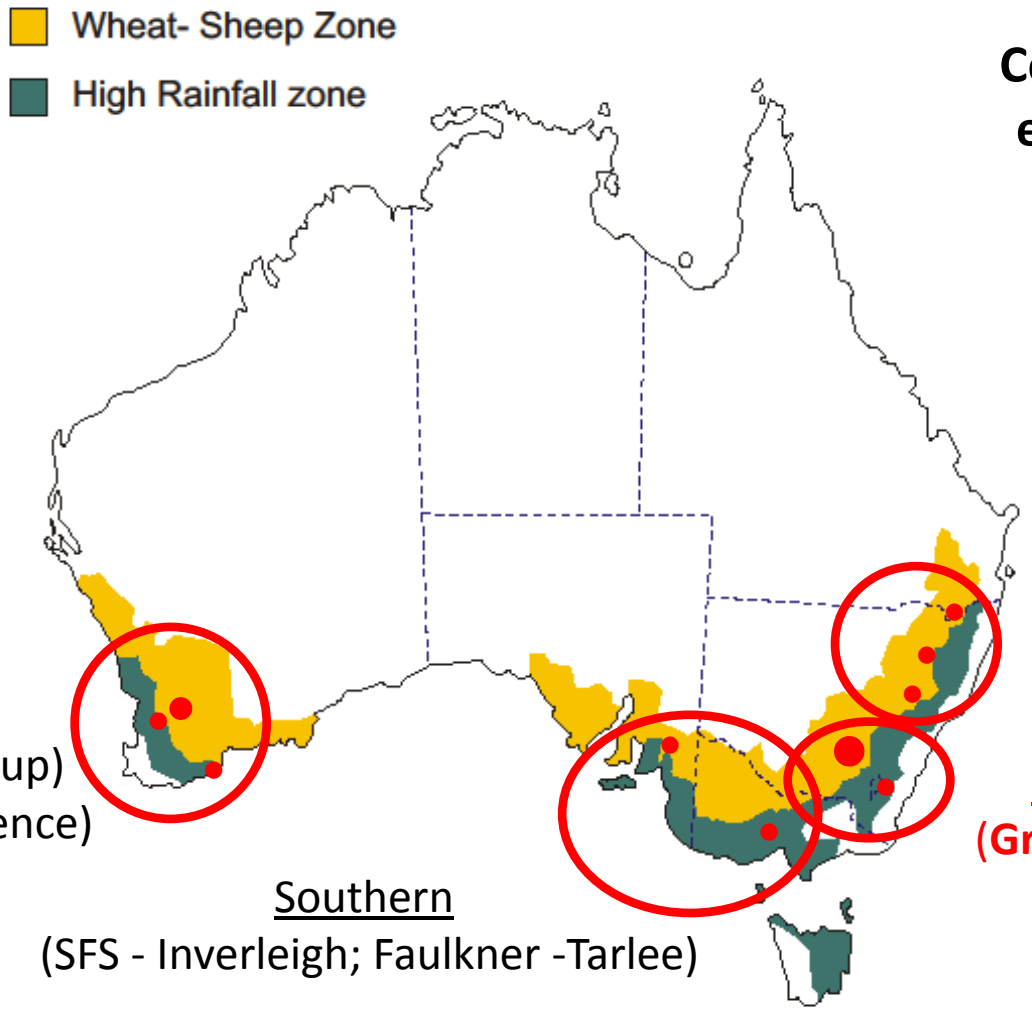
"Generally positive results, some yield penalties on crops grazed late. Canola will become a standard option in the feed-base. The concept has moved from the experimental to operational".

Site/Year	Variety	GSR (mm)	Sowing date	Grazing		Yield (t/ha)
				Time	DSE.day/ha	
Young '08	Taurus (W)	300	7/4	16/6-14/8	2600	3.8
Young '07	Garnet (S)	300	16/4	2/7-30/7	700	3.7
Temora '11	45Y82 (S)	200	14/4	24/6-26/6	800	3.4
Wagga '08	46Y78 (S)	182	8/5	1/8-15/8	462	0.6
Sea Lake '12	43C80 (S)	103	19/4	2/7-26/7	(1.0 t/ha)	1.6

Recent research

GRDC Grains Research & Development Corporation
Your GRDC working with you

"Refining crop and grazing management of DP crops"



Collaborative sites established 2013

Northern (Bell)
(Gatton; Coolah)

West
(Heping - Kojonup)
Seymour – Esperence)

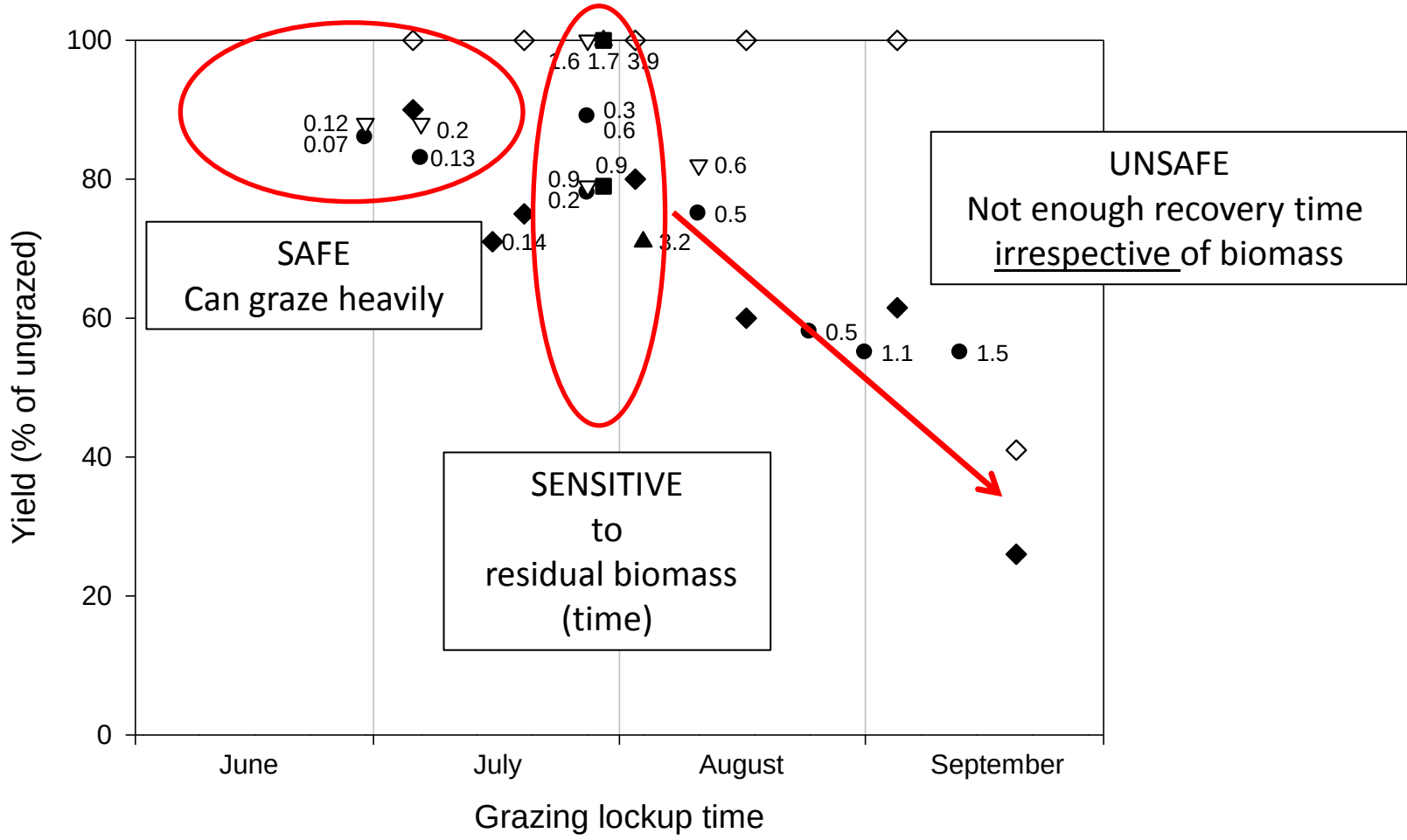
Southeast
(**Greenethorpe**)

Southern
(SFS - Inverleigh; Faulkner -Tarlee)

CSIRO

Lock-up time and residual biomass

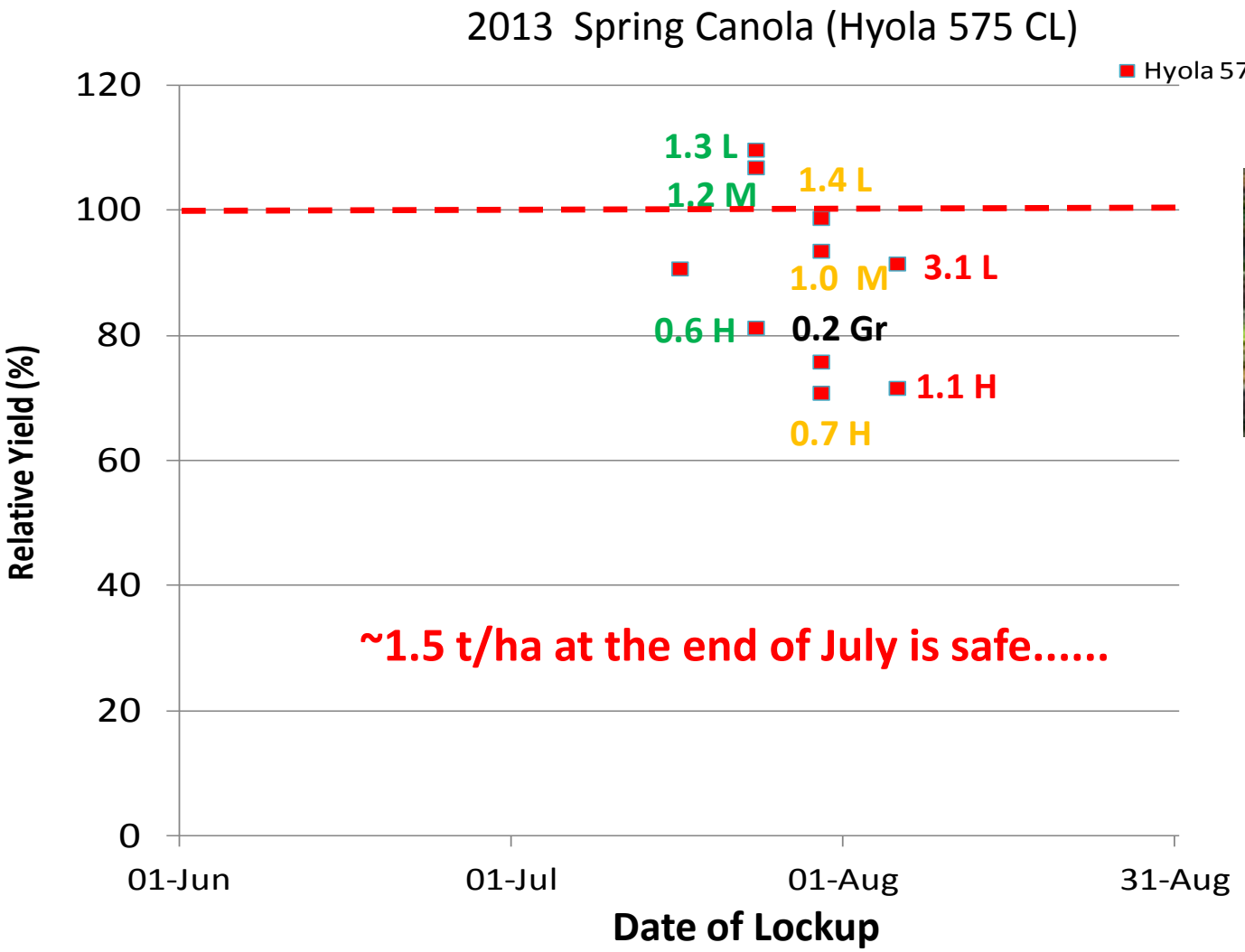
Canola experiments at Young 2007-2009 – sown mid-April



Kirkegaard et al., (2012) Field Crops Research 63, 429-43

Greenethorpe site (Iandra)

Lock-up time and residual biomass



1.0 t/ha

0.2 t/ha

Highest paddock return with some yield loss

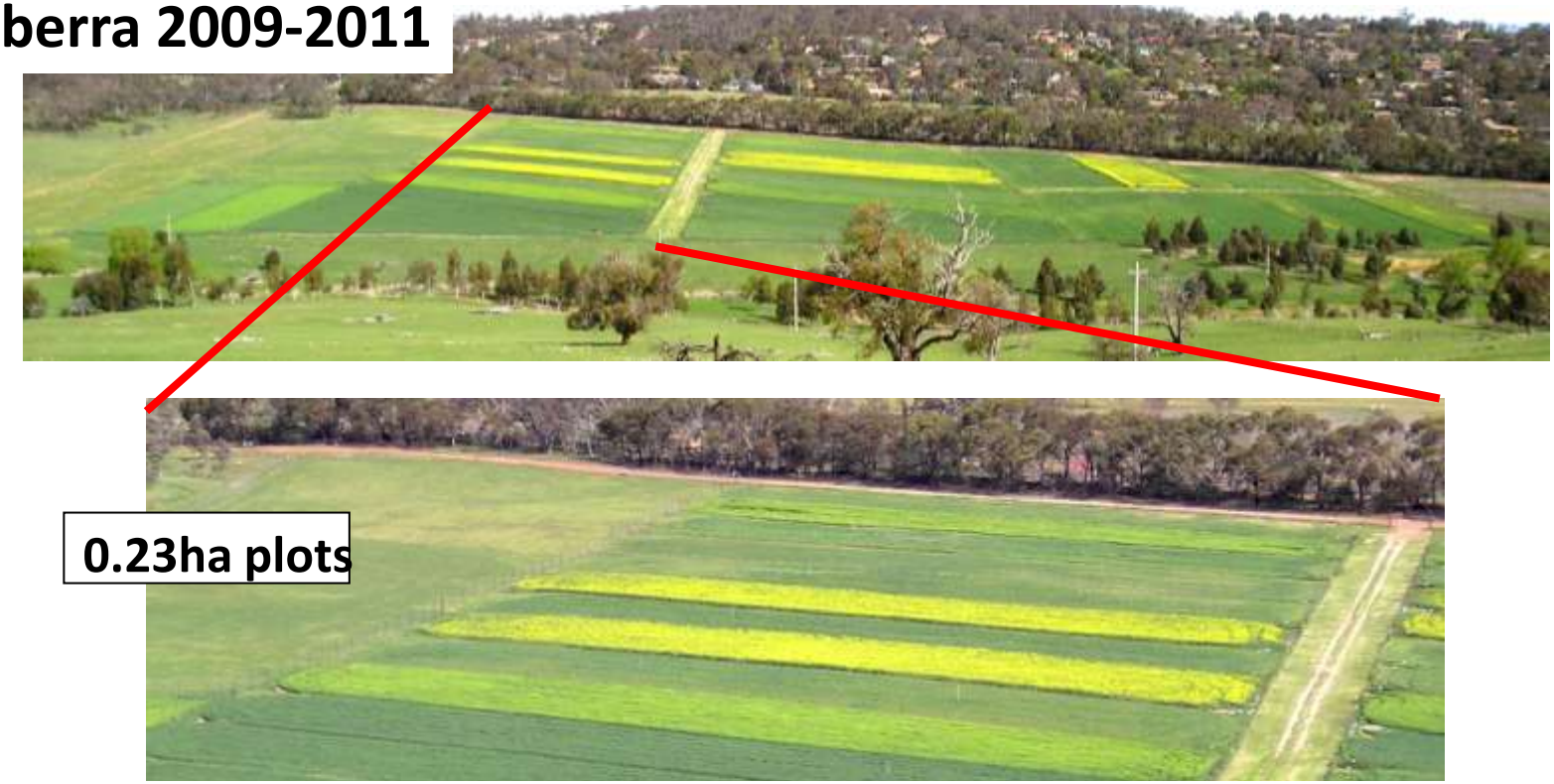
Crop and variety	Treatment	Lock-up	Biomass Removed (t/ha)	Residual Biomass (t/ha)	Yield (t/ha)	Extra Return ($/ha)
HYOLA971CL (sow 25/3)	**Uncut**				**2.8**	
	6-8 lf + July	**7/5, 24/7**	2.4	2.6	**2.6**	**+500**
	6-8 lf + Aug	**7/5, 6/8**	3.8	3.6	**2.8**	**+940**
	Grazed	4-6/7	5.6	0.4	2.0	**+1025**
HYOLA575CL (sow 23/4)	**Uncut**				**2.8**	
	6-8 lf Hard	**17/7**	0.7	0.2	**2.6**	**+40**
	SE Hard	30/7	1.4	0.7	2.0	**-65**
	SE Mod	30/7	1.1	1.0	2.8	**+255**

Kirkegaard et al., (2014); Bell et al., (2014) GRDC Updates Temora, Wellington

CSIRO

Whole farm benefits – system experiment

Canberra 2009-2011



- Pasture spelling benefit evaluated
- Combined wheat + canola grazing system
- Benefits maximised at ~15% DP crop **[+$100-200 per farm ha]**

Bell et al., (2014) Crop and Pasture Science (in press)

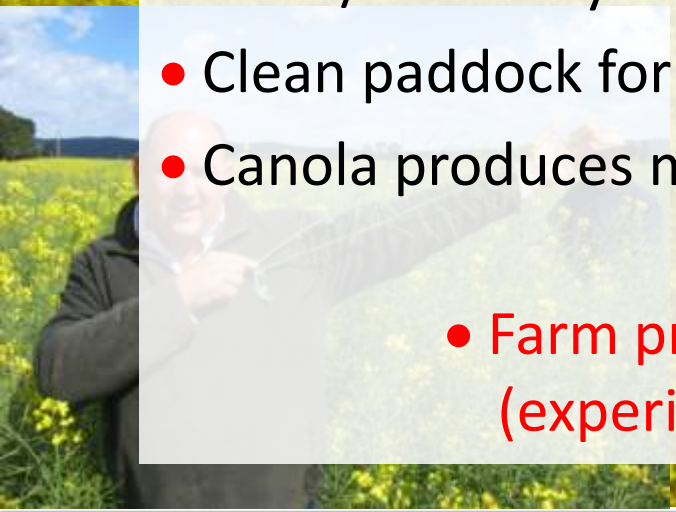
Farm adoption – Angus Gibson (Goulburn)

"A decade ago we only grew fine wool……

Now we produce a range of crops and pastures for forage, silage, hay and grain as well as meat from sheep and cattle"

Year	Canola (ha)
2008	0 (trial)
2009	200
2010	3000

Farm adoption – Peter Brookes (Goulburn)



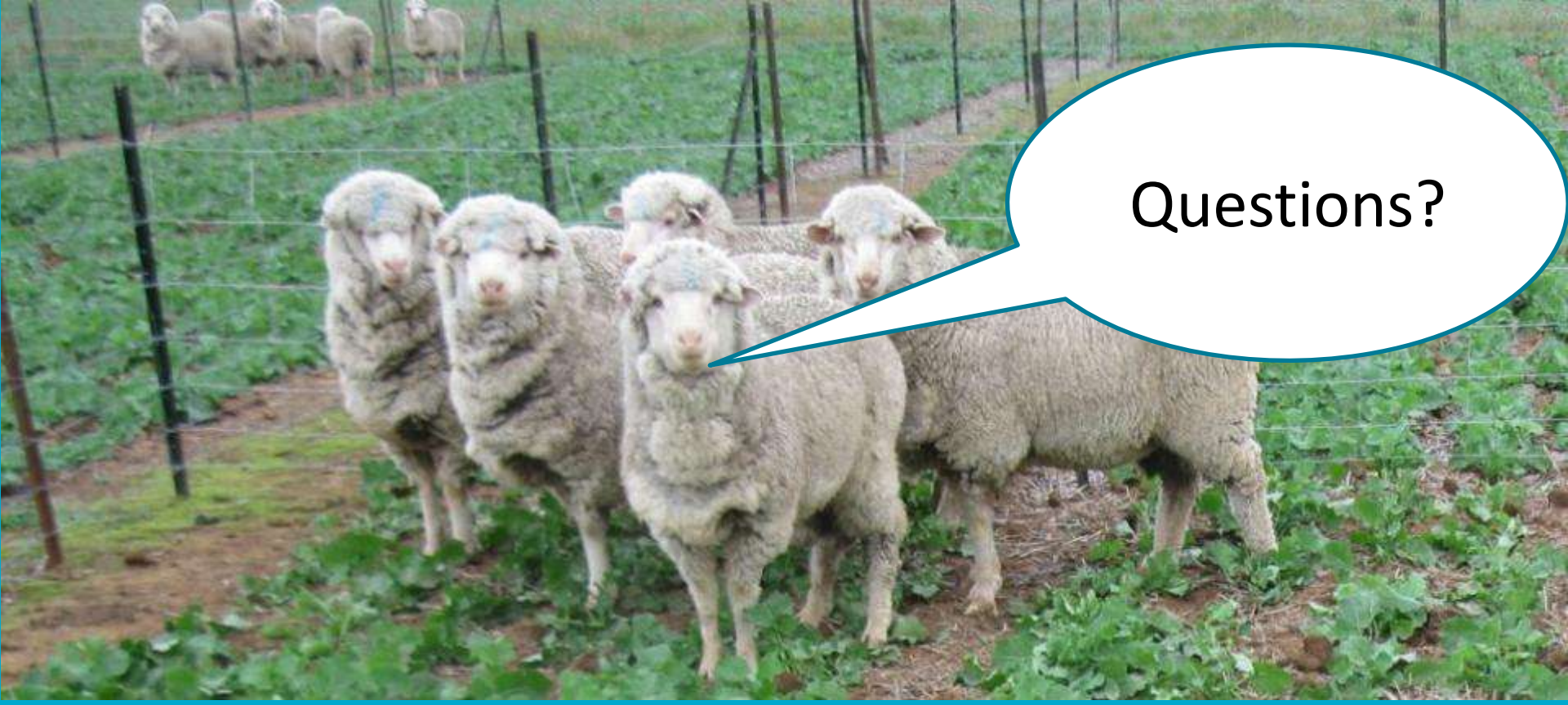
- All winter canola (800ha) - sown early March
- Grazed 16/4 to 16/8 @ 23 lambs/ha (35 kg in, 50 kg out)
- At 2 t/ha seed yield = Operating profit **$1000/ha**
- Clean paddock for wheat (1.5 t/ha yield increase in wheat)
- Canola produces more early biomass for grazing than wheat

- Farm profits increase **$100 per farm ha**
(experiments, modelling, top growers)

Bell et al., (2014) Crop and Pasture Science (in press)

Farm adoption – Andy Fowler (Condingup, WA)

Increased crop area by 10% and winter dse from 12 to 18/ha



GRDC Grains Research & Development Corporation
Your GRDC working with you

kalyx

Alex Murray
Peter Hamblin
Rod Kershaw

SUSTAINABLE AGRICULTURE FLAGSHIP
www.csiro.au

CSIRO

Thank you

Measured whole-system level benefits (2013)

Value $ per farmlet ha		Permanent Pasture Control	Pasture + PPCW:
GROSS MARGIN		**310**	**434**
Income	Grain		256
	Wool	457	380
	Lambs	455	341
Expenses	Suppt feeding	**244**	**89**
	Fertilizer	45	131
	Other crop & pasture		107
	Other livestock	313	216

Optimum grazing time


The twist test

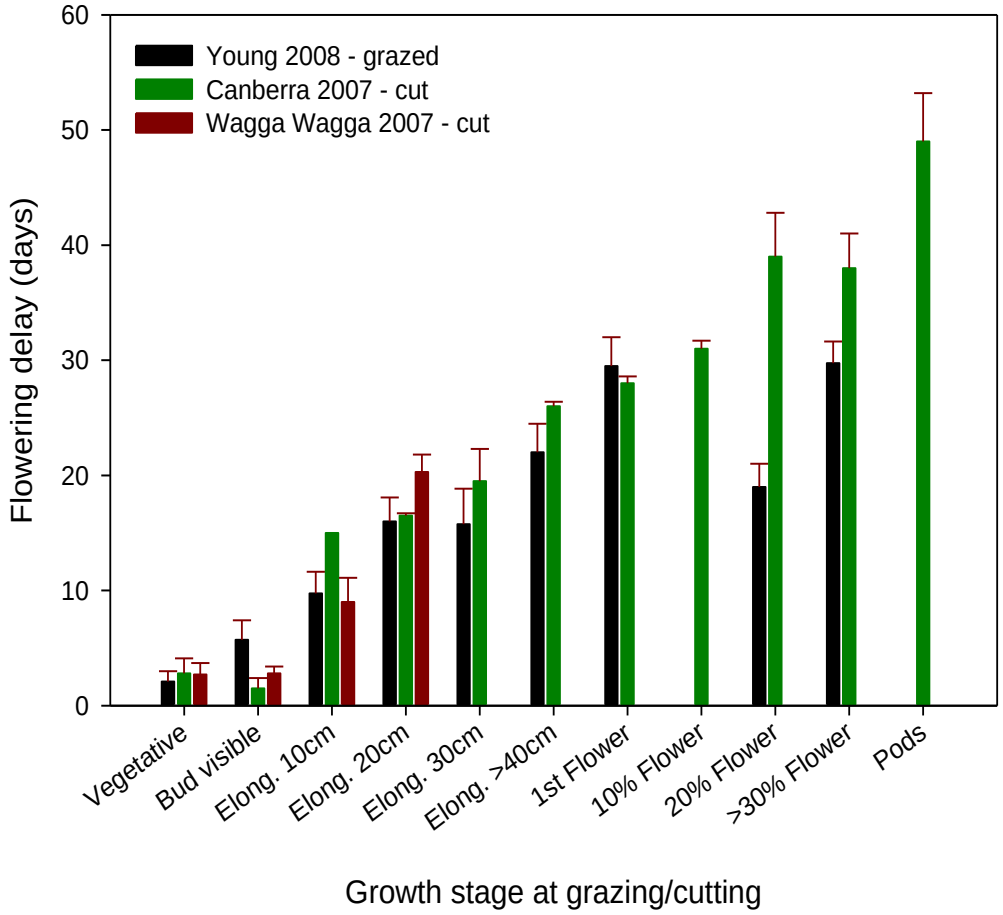

OK to start


Monitor bud elongation


Getting late

Timing of removal is the key!

- Grazing after buds elongate > 10 cm delays flowering, potentially reducing yield



Grazing canola at Temora (2010 and 2011)

Two field experiments with **FarmLink** at Coleman's (Water-Use Efficiency Site)

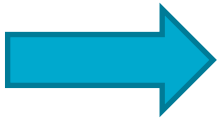
Sown	GSR	Grazing			Variety	Yield (t/ha)	
	(mm)	Time	SR	DSE.d/ha		UG	Graze
15 April	460	30/6-1/7	Crash	517	Tawriffic	4.1	4.0
14 April	200	24-25/6	Crash	~800	45Y82	3.4	3.1

Residual biomass 0.4 t/ha

Grazing canola at Wagga Wagga (2008)

Two field experiments grazed by sheep in a hot, dry season

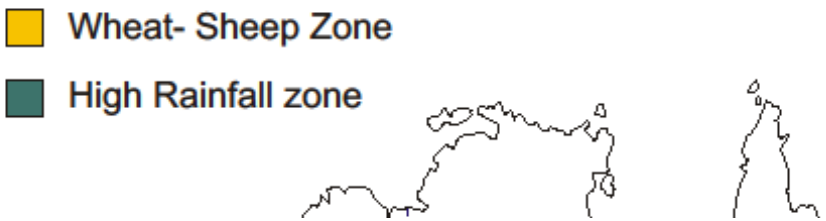
Sown	GSR (mm)	Grazing			Varieties	Yield (t/ha)	
		Time	SR	DSE.d/ha		UG	Graze
29 April	350	4-11/7	28 DSE	196	46Y78 Garnet Marlin	1.6	1.5
8 May	182	1-15/8	33 DSE	462	46Y78 Garnet Marlin	0.6	0.4*



Residual biomass 1.0 t/ha

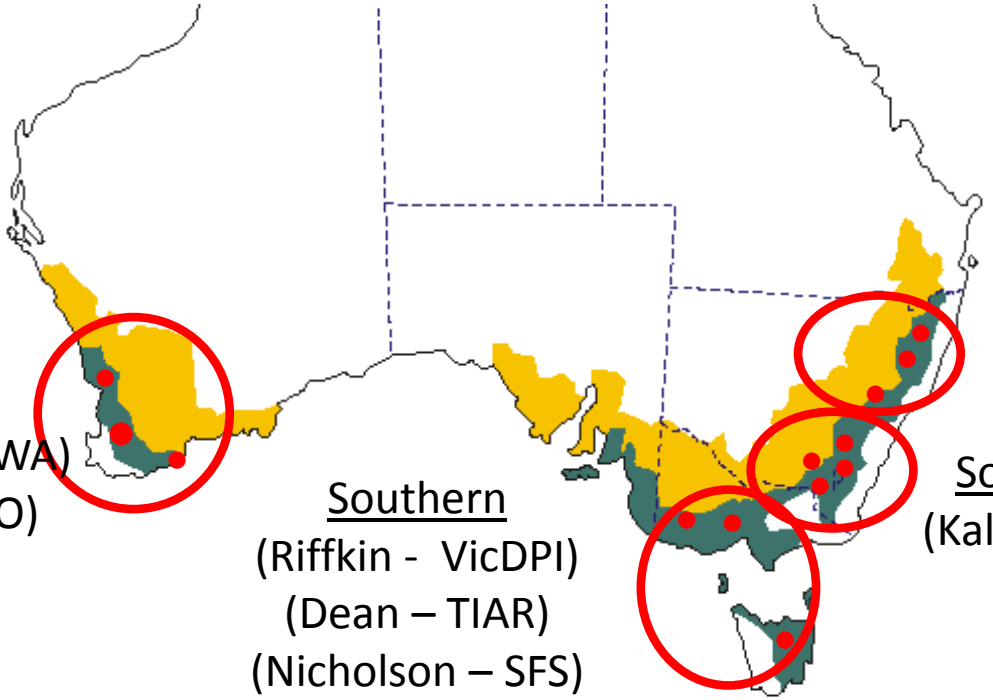
Recent CSIRO canola research - Experimental

- CSP00132 (2009-2012)- "Optimising integration of dual-purpose crops in HRZ"



Collaborative sites established 2010

All sites - un-grazed controls with phenology data, biomass, yield



West
(Seymour - DAFWA)
(Heping – CSIRO)

Southern
(Riffkin - VicDPI)
(Dean – TIAR)
(Nicholson – SFS)

Northern
(UNE – CSIRO)
(NSWDPI)

Southeast
(Kalyx-CSIRO)