

LONG-TERM ROTATION DIVERSITY INCREASES WHEAT YIELD AND PROTEIN CONTENT



GRDC
GRAINS RESEARCH
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KEY MESSAGES

- 4 rotations compared over 12 years:
 - continuous wheat; continuous cereal; diverse; district practice
- Diverse rotation had greater yield, and greater protein, than wheat and cereal rotations
- Residue retention had little impact in diverse rotation, but increased protein in cereal rotation
- Highest wheat yield and protein in district practice
 - wheat grown after fallow
 - negative N balance suggests short-term only

CROPPING IN WESTERN AUSTRALIA

- Yields steadily increasing
- Legumes decreasing, canola increasing
- Perception – wheat grain protein content decreasing
- **Does rotation and residue management affect wheat grain yield and grain protein?**

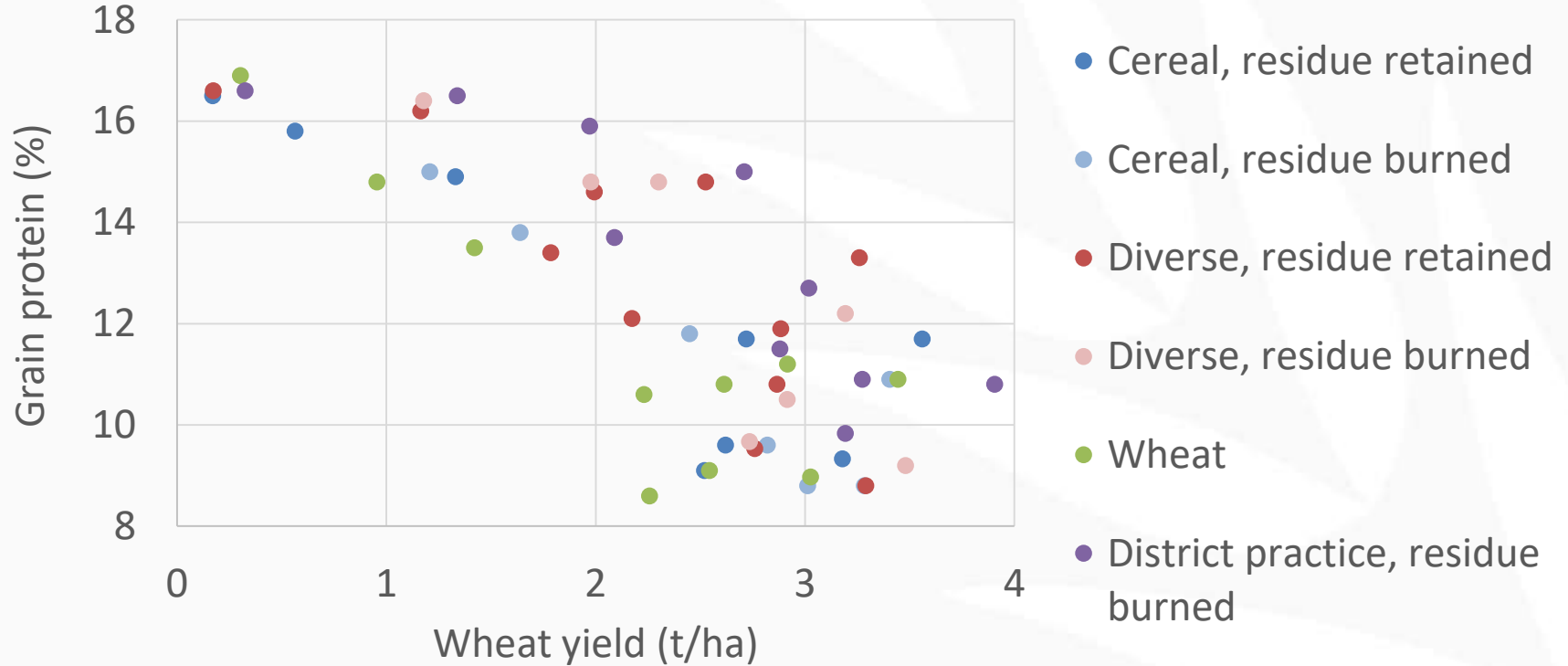
WANTFA LONG-TERM ROTATION TRIAL



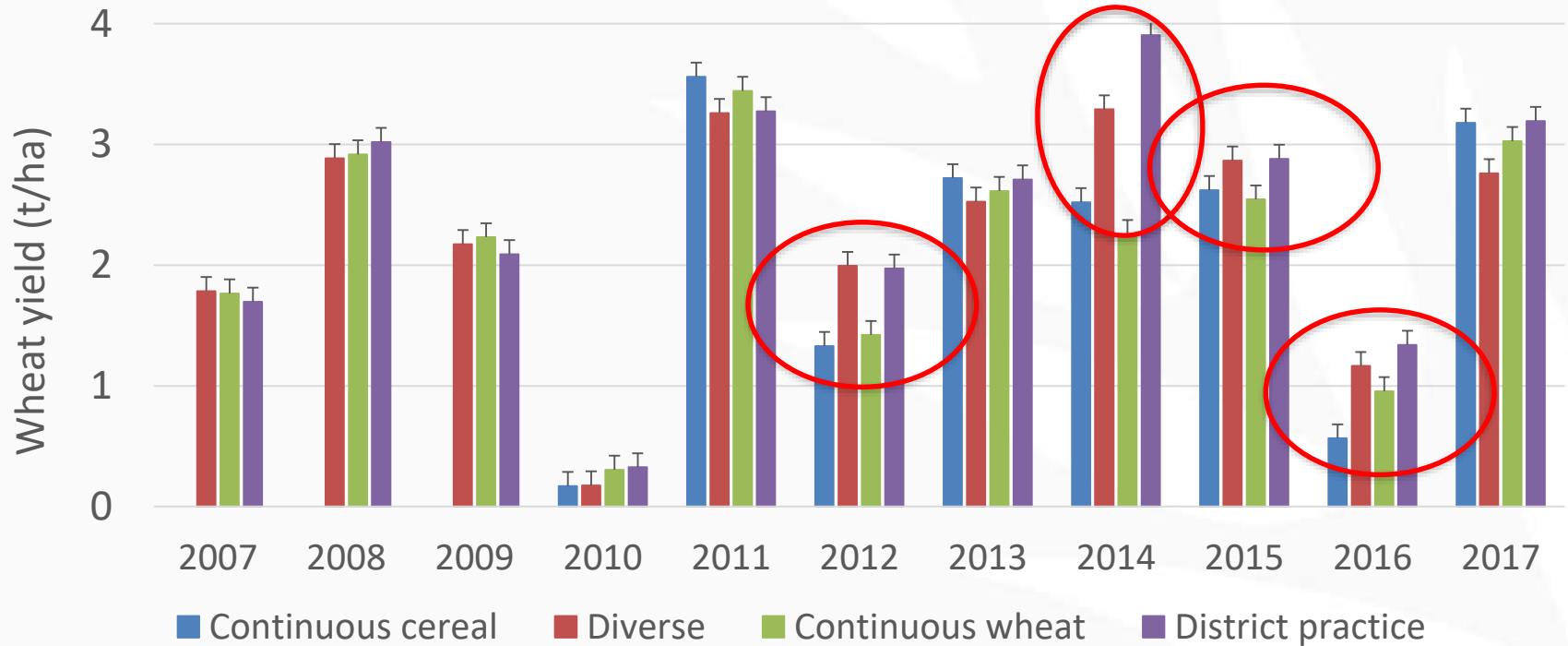
CROP SEQUENCES

Sequence	1	2	3
Year	Continuous cereal		
2007	Saia	Barley	Barley
2008	Barley	Barley	Saia
2009	Barley	Saia	Barley
2010	Wheat	Wheat	Wheat
2011	Wheat	Wheat	Wheat
2012	Wheat	Wheat	Wheat
2013	Wheat	Wheat	Barley
2014	Wheat	Barley	Wheat
2015	Barley	Wheat	Wheat
2016	Wheat	Wheat	Barley
2017	Wheat	Barley	Wheat
2018	Barley	Wheat	Wheat

YIELD AND PROTEIN



WHEAT YIELDS - ROTATION



WHEAT YIELD SUMMARY

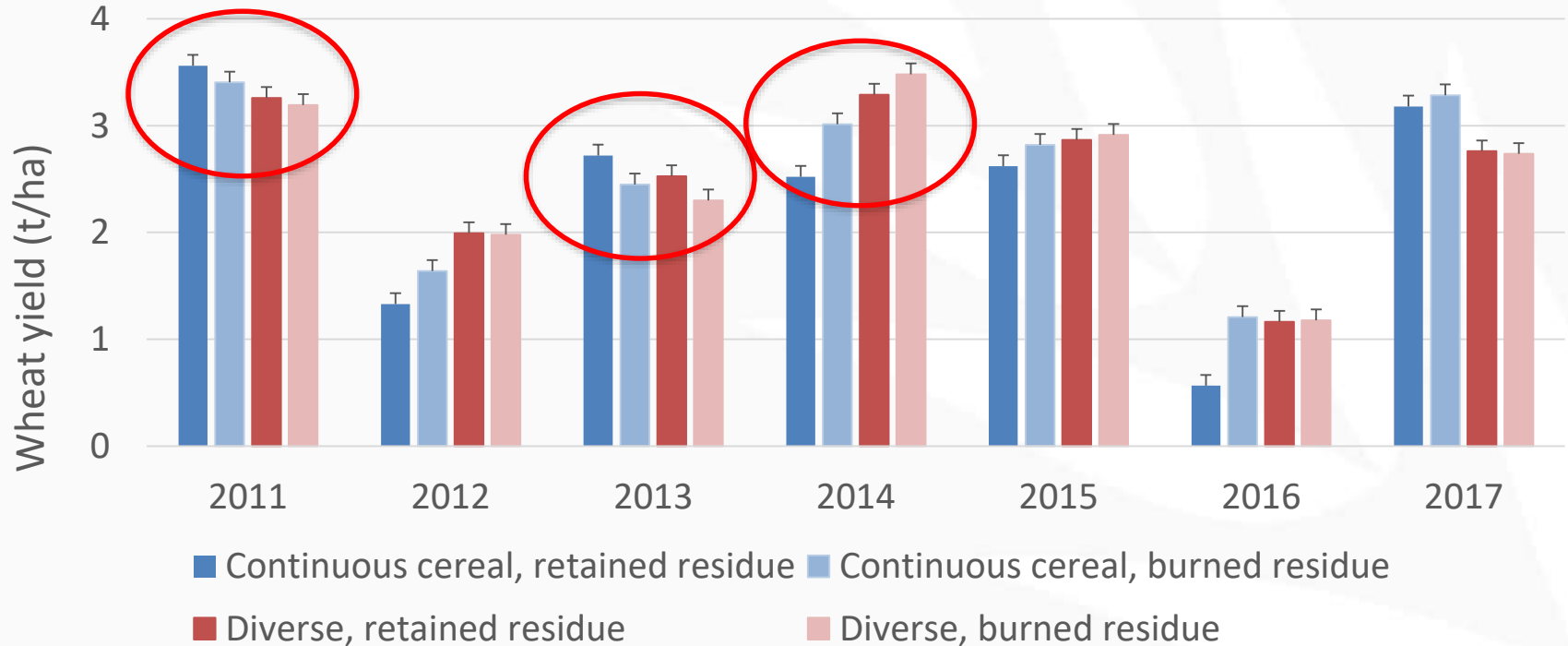
Rotation	2007-09	2010-17
Cereal	na	2.08
Diverse	2.28	2.25
Wheat	2.30	2.07
District	2.27	2.45
LSD	0.12	



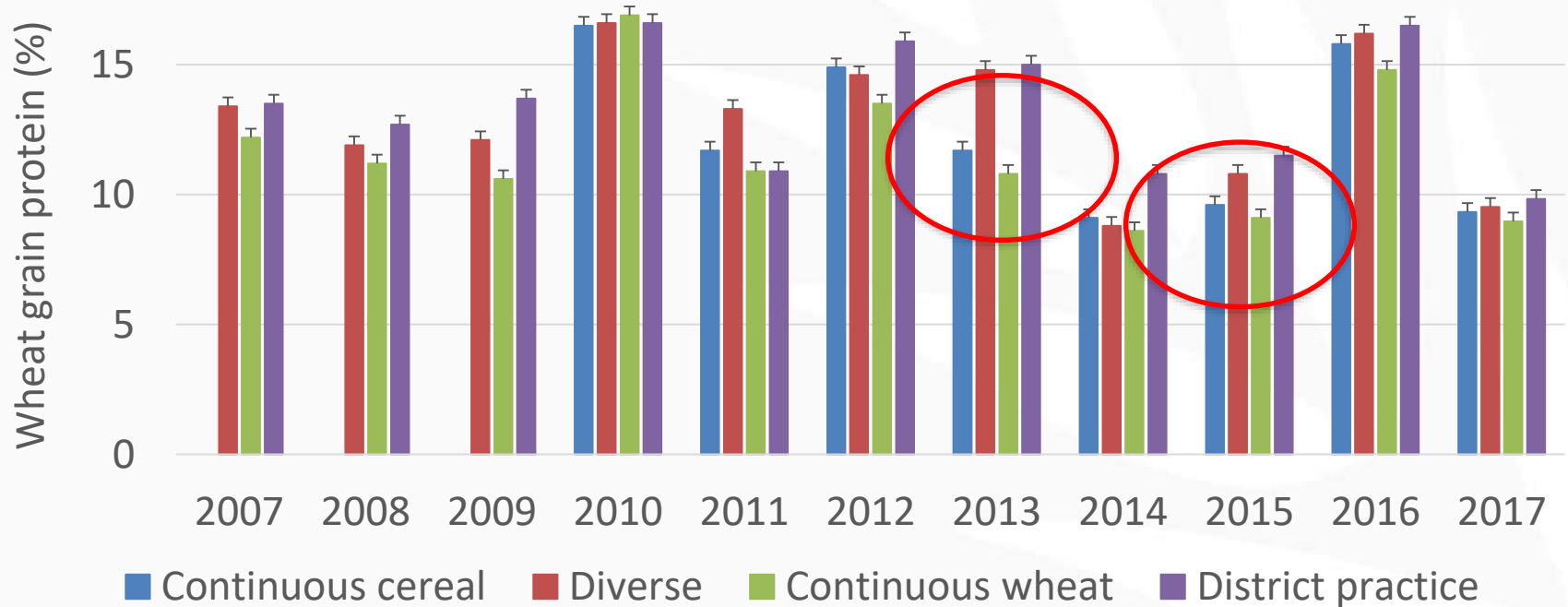
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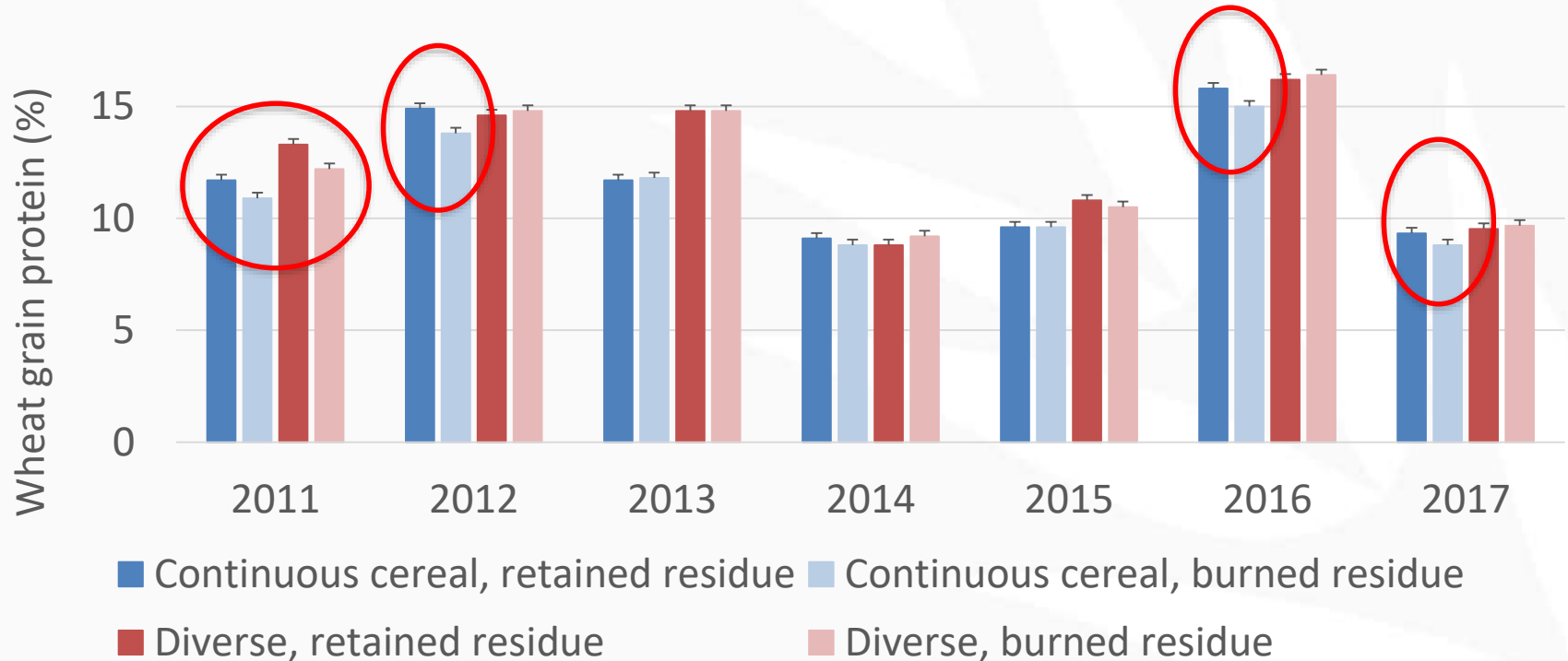
WHEAT YIELDS – RESIDUE HANDLING



GRAIN PROTEIN - ROTATION



GRAIN PROTEIN – RESIDUE HANDLING



GRAIN PROTEIN SUMMARY

Rotation	2007-09	2011-17
Cereal	na	11.73
Diverse	12.47	12.58
Wheat	11.33	10.95
District	13.30	12.92
LSD	0.30	

Rotation	High res	Low res
Cereal	11.73	11.24
Diverse	12.58	12.51
LSD	0.30	

NITROGEN BALANCE 2007-2017

Treatment	Cumulative N balance (kg N/ha)	Annual N balance (kg N/ha/yr)
Continuous wheat	98.4	8.9
Continuous cereal	54.7	5.0
Diverse	156.5	14.2
District Practice	-94.5	-8.6

- High-residue treatments for wheat, cereal and diverse rotation
 - District practice burnt (with N loss) from 2010 onwards
- Includes estimate for N fixation in legumes
- No estimates of other N loss – leaching, etc

CONCLUSIONS

- Increased wheat yield and protein in the diverse rotation
- Residue retention increased protein in the cereal rotation
- Greatest yield and protein in the 'district practice' rotation

Wheat grown after fallow

Negative N balance suggests short-term only

Grains Research and Development Corporation (GRDC)

A Suite 5, 2A Brodie Hall Drive, Bentley, WA 6102 Australia

P PO Box 5367 Kingston, ACT 2604 Australia

T +61 8 9230 4600

www.grdc.com.au

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