Oak Park Research

Rotations and Break Crops:

Setting the Scene

Dermot Forristal, John Carroll, Faisal Zahoor

Teagasc
Oak Park Crops Research

Outline

- Rotations/ break crops –why now?
- Teagasc Research 2014 / 2015
- Knockbeg Systems/Rotation Trial:
  - Effect of Break crops on Cereal yields
  - Crop Margins
- Lessons for future

Why Rotations/Breaks Now ?

- Ireland Crop Production:
  - In the past: Grass rotations on 'Mixed' farms
  - Sugar beet gone
  - Break crops: 9.6% of arable area
- Continuous cereal production for 20-35 years
- Benefits of Rotations
  - Fertility
  - Disease breaks
  - Weed control (grass weeds)
  - More crop / market choices
- EU regulations and support

Teagasc:Break Crop Research

- CROPQUEST
  - DAFM funded desk study (2 year – half way through)
  - Review opportunities for break crops.
  - Including new market options.

    (F. Zahoor, J. Carroll, DF.)

- Oilseed Rape (part 'Grain levy' funded)
  - Crop Establishment Systems
    - Conventional vs Min Till vs Subsoiler incl Row spacing etc.
    - Interaction with management, N requirement.
  - Disease control

    (DF, JS, LG, GL, PhDs)

Teagasc:Break Crop Research

- Break Crop Agronomy (part Grain levy funded)
  - Bean Agronomy (populations, disease etc)
  - Expand beans from end 2015 (PhDs)
    (Establishment, Physiology of yield limitations.)
  - Sugar Beet varieties
    (J.Carroll, JS, DF)
- Oats
  - New Programme 2015: Yield, Quality, Lodging, Mycotoxins
    (J.Finnan)

Bean Trial Harvest Yesterday !

Are Break Crops beneficial?

- Not that much relevant research !
- International review
- Systems / Rotation Trial in Knockbeg

WW yield after break

YIELD Increase

- North America:
  - Legumes/Oilseeds **+ 16%** (-50% to + 60%)
- Australia
  - Legumes/ Oilseeds **+ 33%** (-25% to +187%)
- Europe
  - Legumes/Oilseeds **+ 24%** (-27% to +224%)

WW yield after break

	YIELD Increase		Base Yield
North America:			
▸ Legumes/Oilseeds	**+ 16%**	(-50% to + 60%)	2.4t/ha
Australia			
▸ Legumes/ Oilseeds	**+ 33%**	(-25% to +187%)	2.6t/ha
Europe			
▸ Legumes/Oilseeds	**+ 24%**	(-27% to +224%)	4.8t/ha

WW yield after break

	YIELD Increase		Base Yield
North America:			
Legumes/Oilseeds	+16%	(-50% to + 60%)	2.4t/ha
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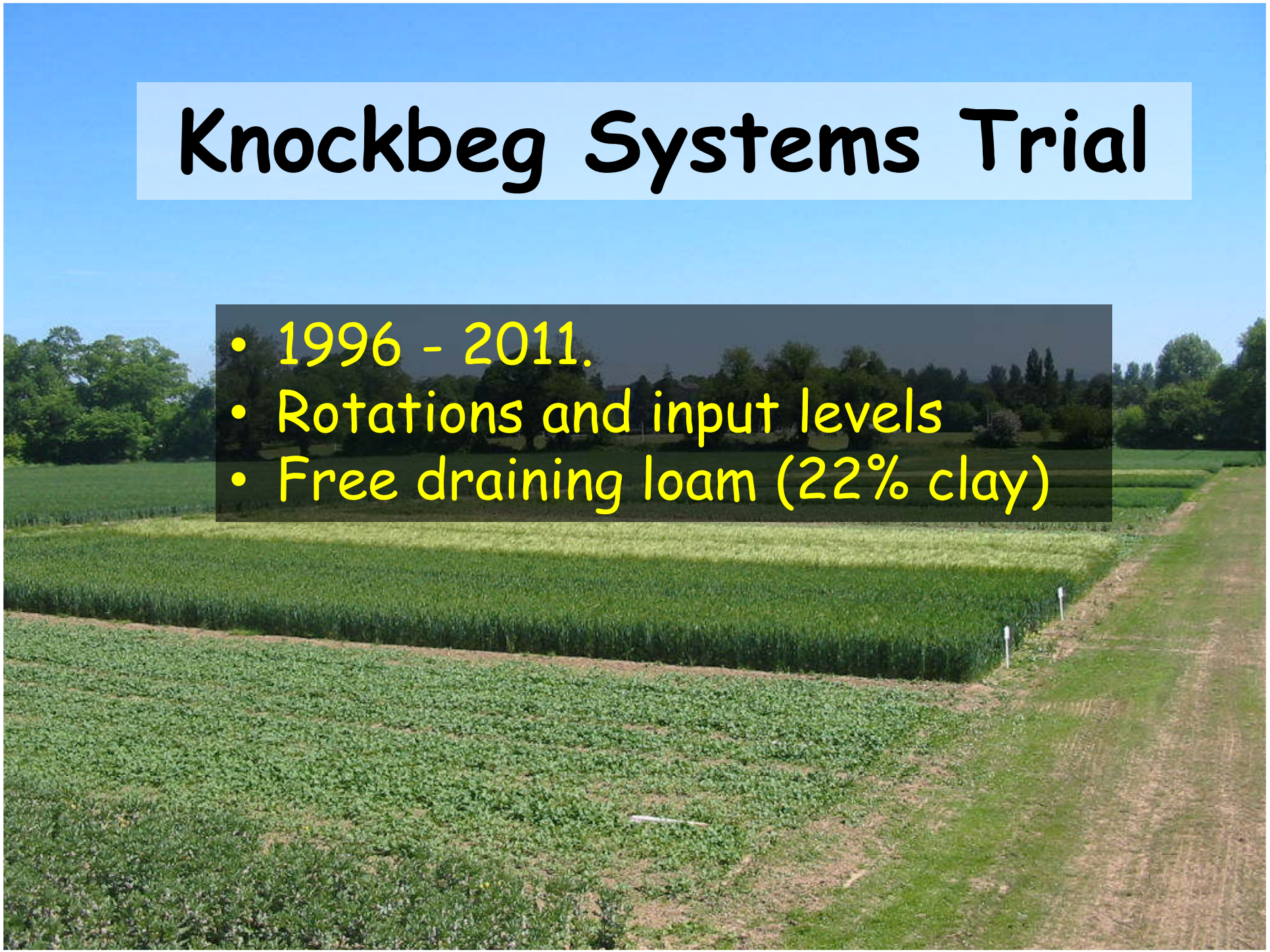
Legumes/ Oilseeds	+ 33%	(-25% to +187%)	2.6t/ha
Europe			
Legumes/Oilseeds	+24%	(-27% to +224%)	4.8t/ha
Europe (Higher yield)			
Legumes	+ **4.1%**	(-27% to +28%)	7.3t/ha
OSR	+ **10%**	(0 to +39%)	7.5t/ha
Oats (1 study)	+ **38%**		7.1t/ha

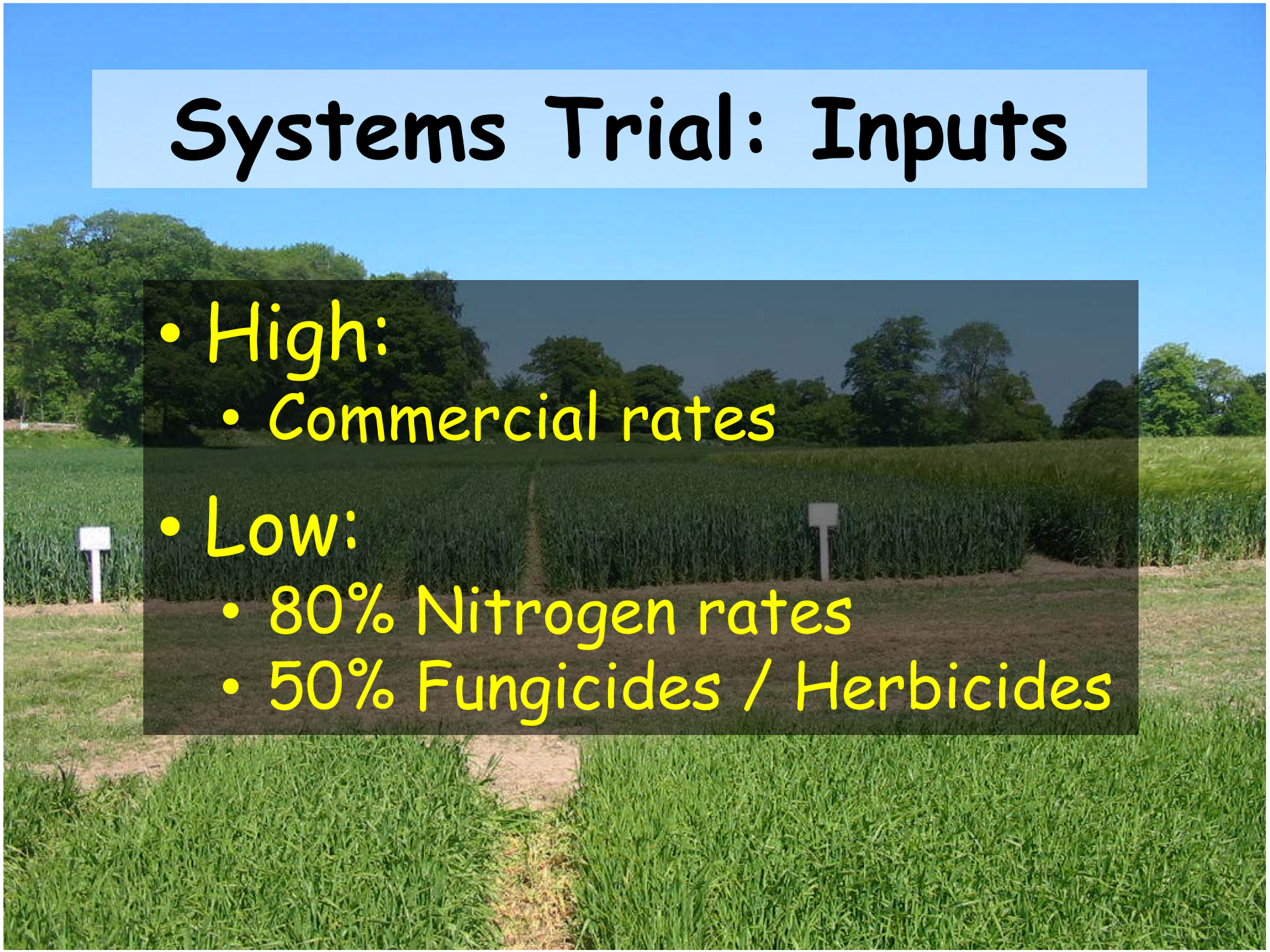
Knockbeg Systems Trial



- 1996 - 2011.
- Rotations and input levels
- Free draining loam (22% clay)

Rotations and Monoculture

	Break Crop (BC)	Cereal Rotation (CR)	Mono	Mono
1	W. Wheat	W.Wheat	W. Wheat	S. Barley
2	S. Barley	W. Barley		
3	S. OSR	W. Oats		
4	W. Barley			
5	Beans			



Systems Trial: Inputs

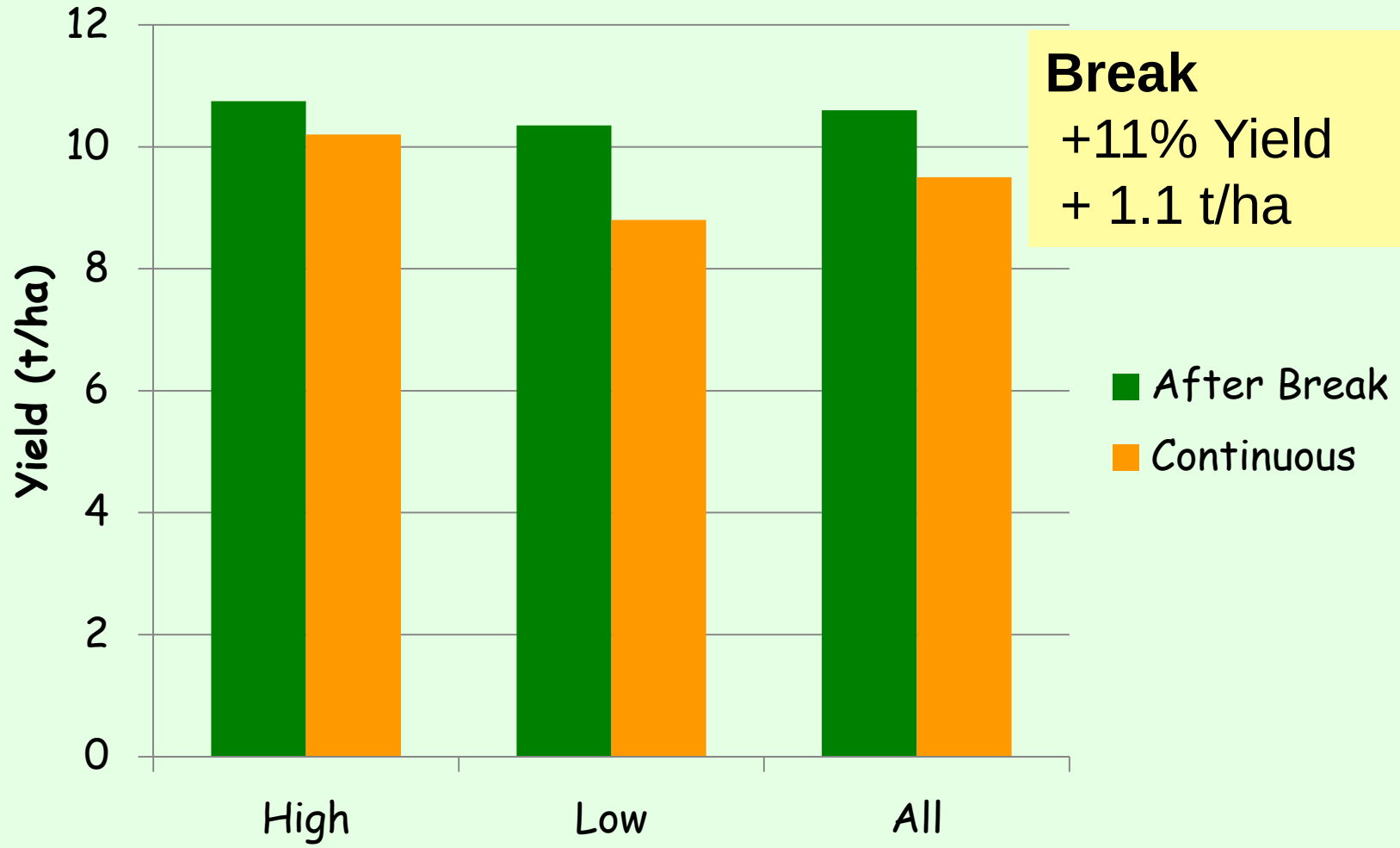
- High:
  - Commercial rates
- Low:
  - 80% Nitrogen rates
  - 50% Fungicides / Herbicides

Crops and measurements

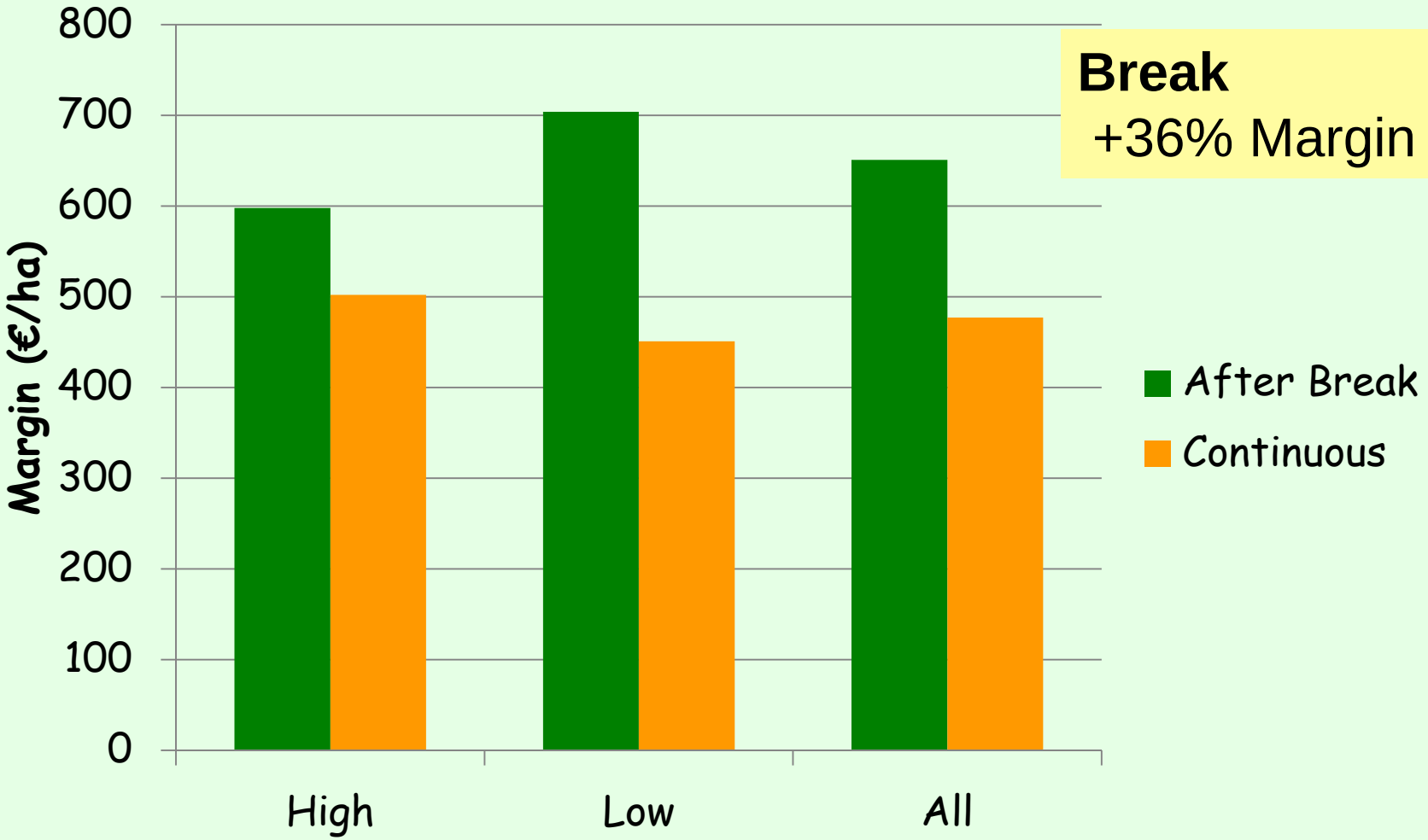
- Comparing cereal crops grown in rotations
  - W. Wheat, W. Barley, S. Barley
- 7 years data: 2004 – 2010 inclusive
- Grain Yield (t/ha at 15% m.c.)
- Net Profit Margin
  - Standard costs (Inputs and machinery) 2011 prices
  - Individual Crop margins
  - Complete Rotation margins

Results: Yields and Margins

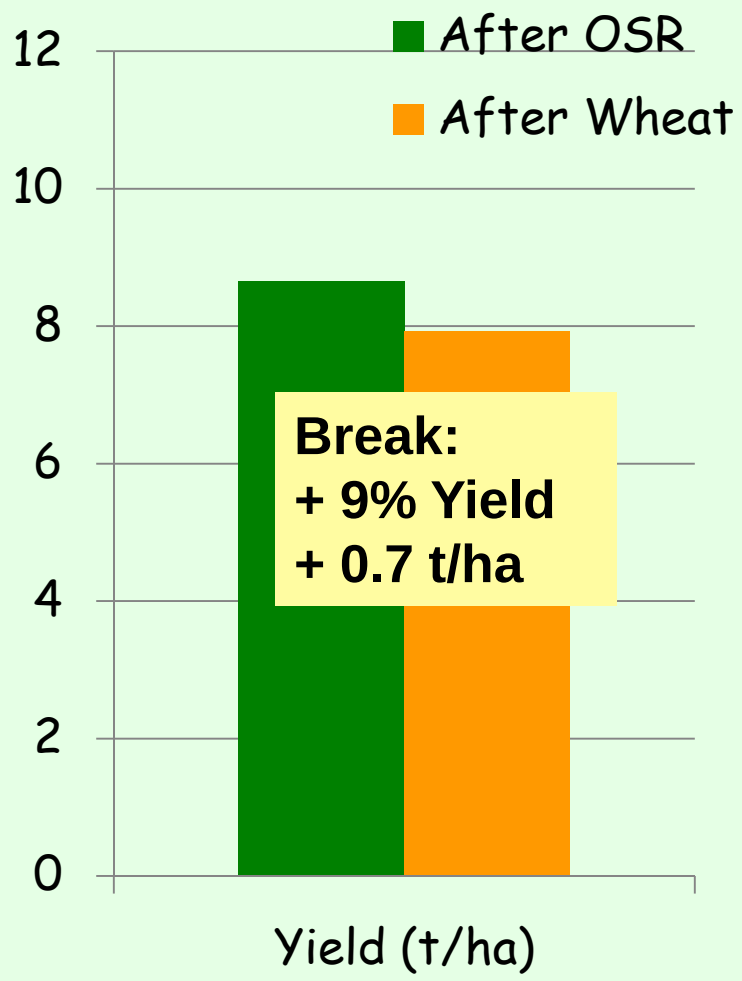
Wheat after Break (t/ha): all years

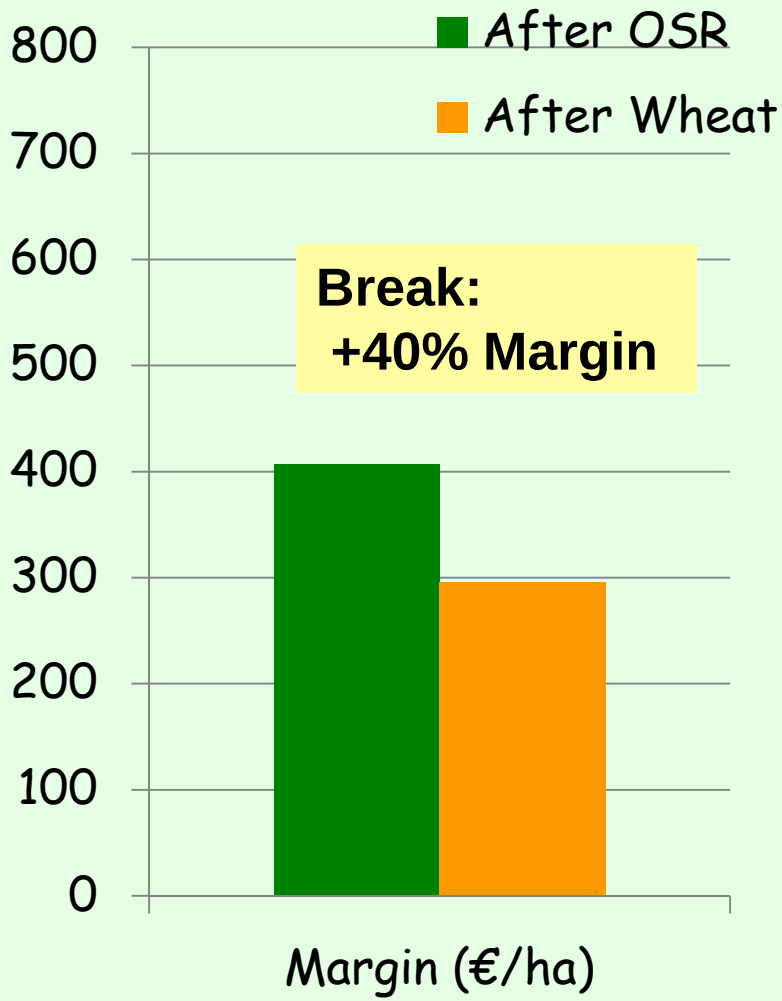


Wheat Margin (€/ha): all years

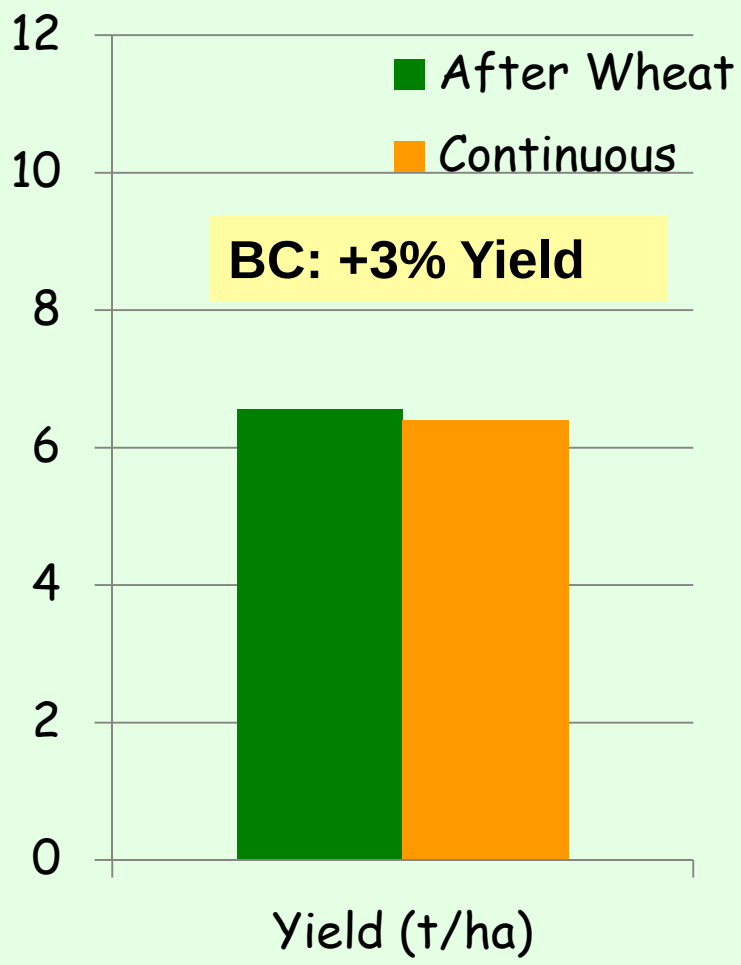


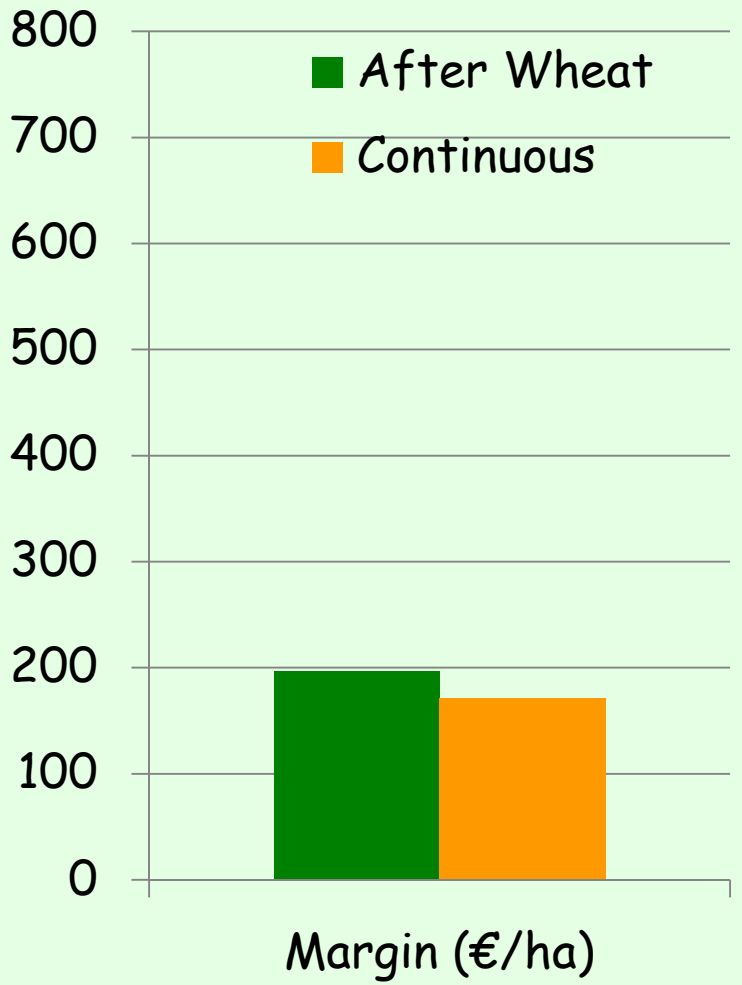
W.Barley after break: Yield+Margin





Sp. Barley Yield and Margin

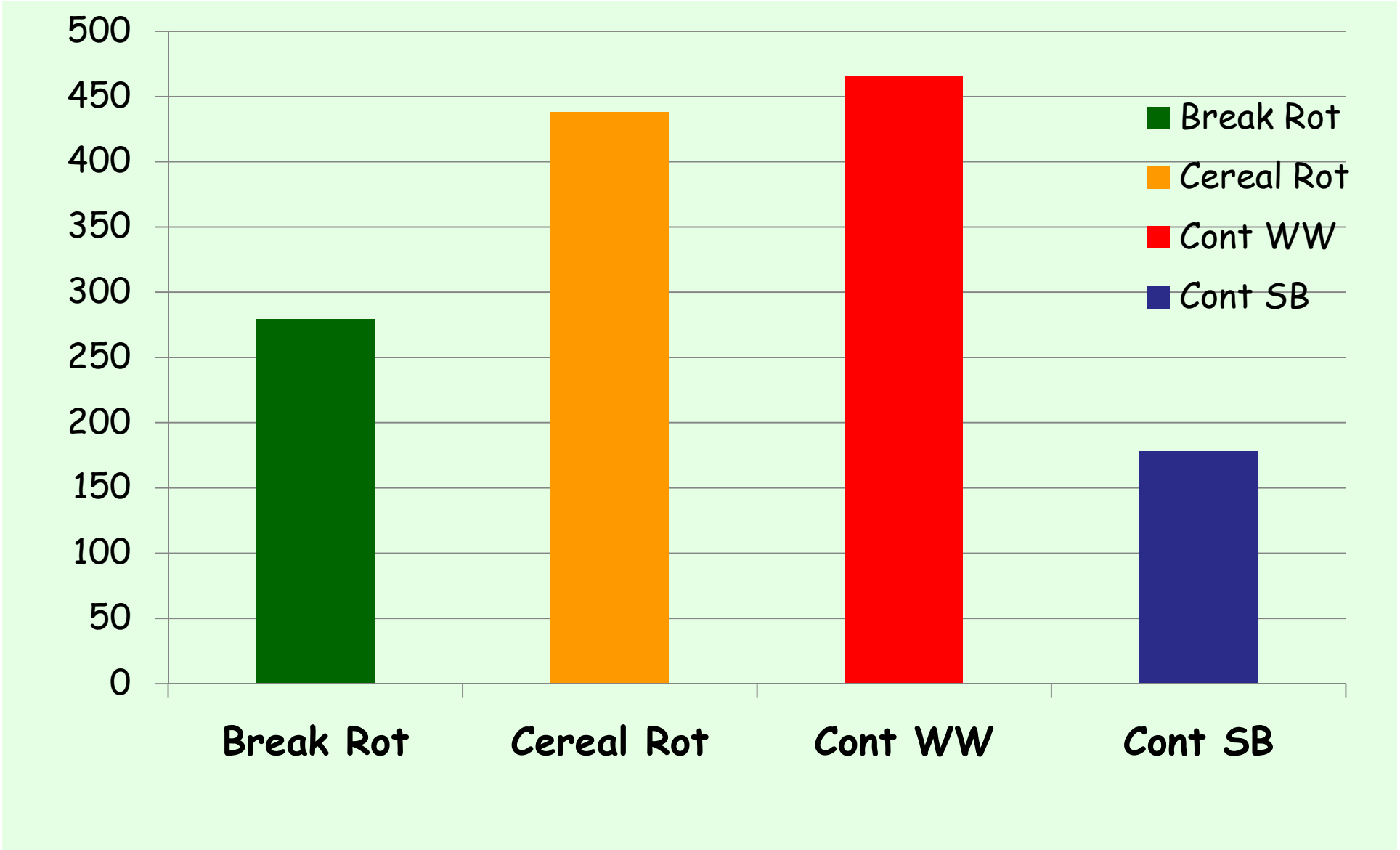




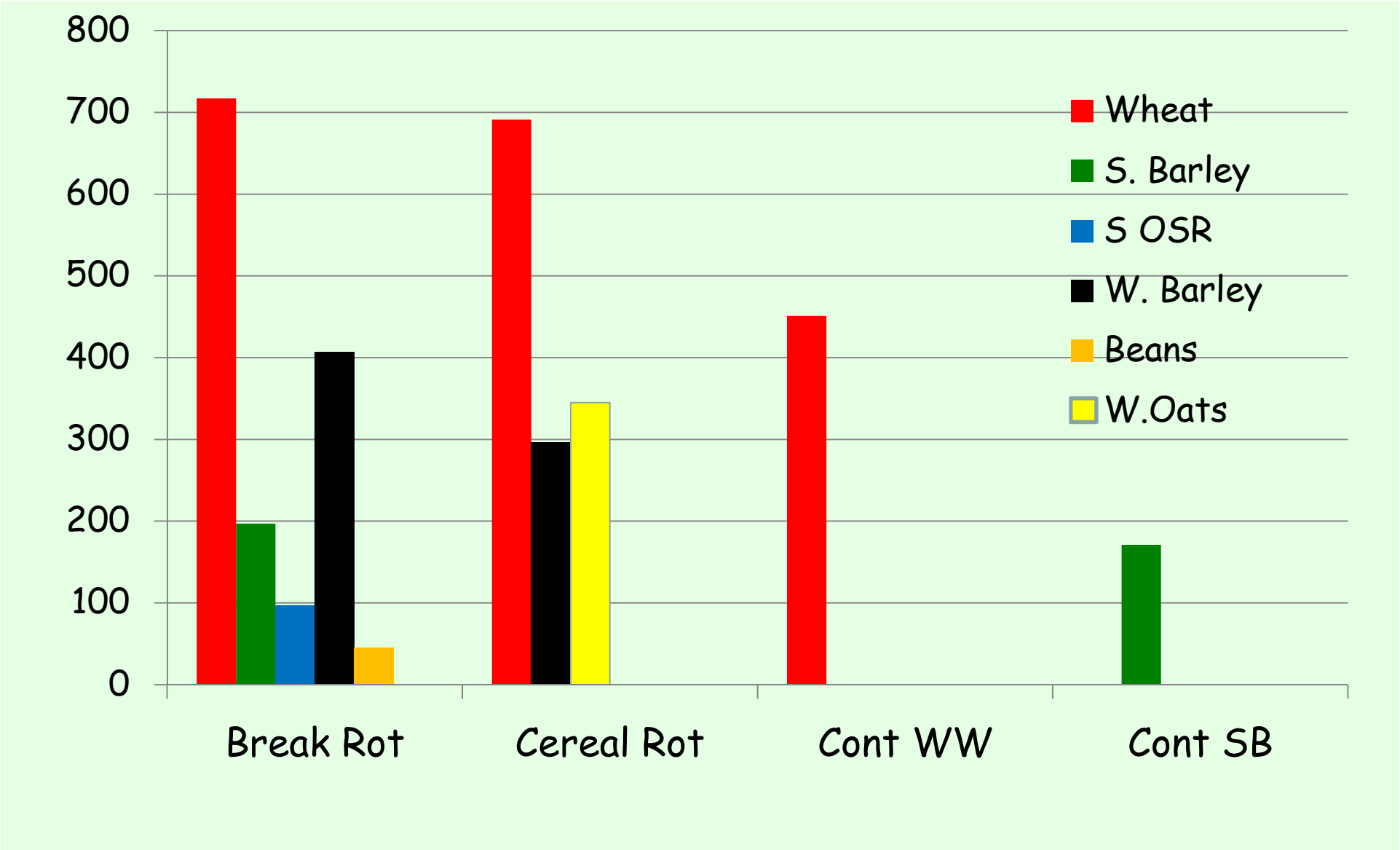
Results: Complete Rotations

- All Years

Entire Rotations and Margin (€/ha)



Rotation crop element margins (€/ha)



Yield Variability

- W. Wheat Low Input: -10% to + 8%
  High Input: -11% to + 16%
- Spring OSR : -10% to + 40%
- Beans : -34% to + 28%

Summary

- Performance varies; particularly break crops.
- Break crop benefits the following crop:

  W.Wheat and W.Barley
- Rotation interacts with input levels

  - some scope to save costs.
- Entire rotations must be considered:
  - Individual crop performance important
  - Suitability to site important

Practical considerations

- Performance from all rotation components vital
- Agronomy of 'break' crops must be optimised
- Build profitable rotations
  - Know: **Yield**, **Costs**, **Profits** for each crop on your soils
  - Know short term and long term rotation benefits
  - Due regard to market for break crops
  - Make decision based on Profit and long term benefits
- E.g. for Knockbeg:
  - Legume/OSR, W.Wheat, W.Oats, W.Wheat, W.Barley

Conclusions

- Must balance agronomic requirements with profitability.
- Choose component crops wisely

- Research needed on Break crops
- Market needed for Break crops

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