

# Crop Rotations: Practical Considerations

Dermot Forristal, John Carroll  
Teagasc  
Oak Park Crops Research

CAFRE/UAS/UFU 2<sup>nd</sup> Annual Arable Conference 2014

## Outline

- Rotations -why now?
- Benefit of rotations generally
- Knockbeg Rotation Trial:
  - ▶ Crop Yield
  - ▶ Crop Margin
  - ▶ Overall rotation margin
- Lessons for future

# Why Rotations Now ?

- Ireland Crop Production:
  - ▶ 9% of Agricultural area
  - ▶ In the past: Grass rotations on Mixed farms
  - ▶ Sugar beet gone
  - ▶ Break crops: 9.6% of arable area
- Continuous cereal production for 15-30 years
- Need for Rotations
  - ▶ Fertility
  - ▶ Disease breaks

## Rotations benefit to WW yield

	<u>YIELD Increase</u>	<u>Base Yield</u>
● 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
● Higher yield Europe		
▶ 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.
- Comparing rotations and input levels
- Free draining loam (22% clay) to 700mm overlying heavier sandy clay loam

## Rotations and Monoculture

Crop	Break Crop	Cereal Rotation	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

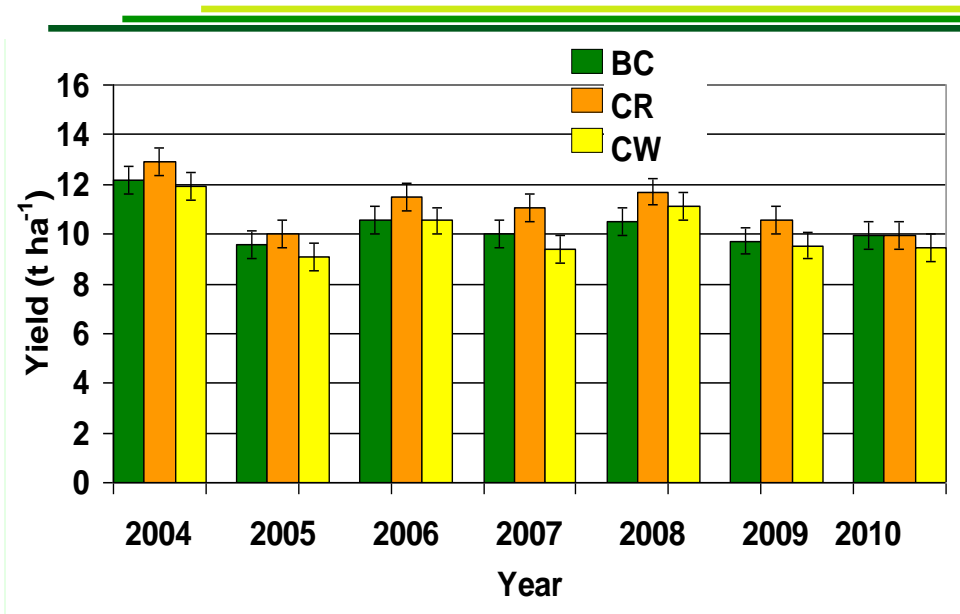
- High:
  - Commercial rates
- Low:
  - 80% Nitrogen rates
  - 50% Fungicides / Herbicides

## Crops and measurements

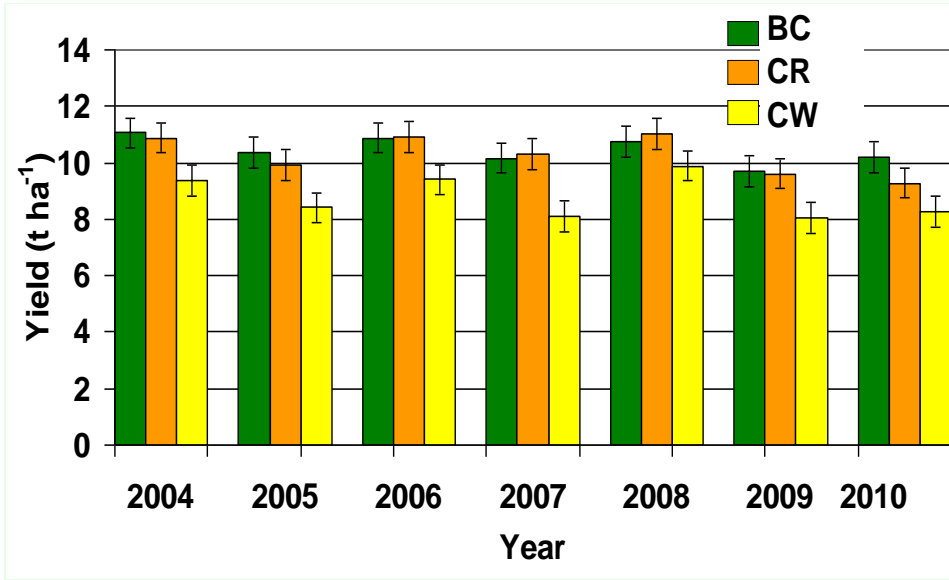
- Comparing cereal crops grown in rotations
  - ▶ W. Wheat, W. Barley, S. Barley
- 7 years data: 2004 - 2010 inclusive
- Grain Yield (t/ha at 15% m.c.)
- Net Profit Margin
  - ▶ Standard costs (Inputs and machinery)
  - ▶ Individual Crop margins
  - ▶ Complete Rotation margins



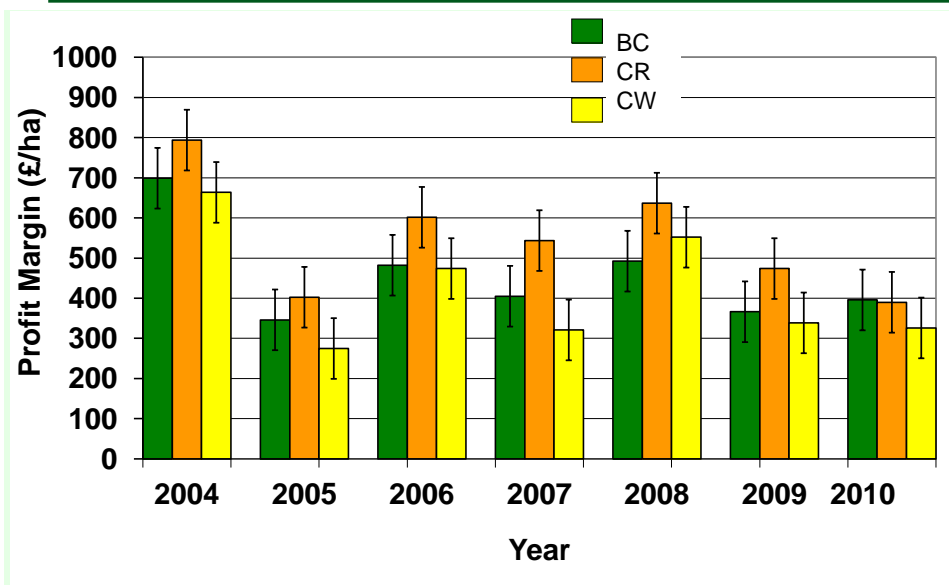
## Wheat Yield: Rotation (High Inputs)



## Wheat Yield: Rotation (Low Inputs)

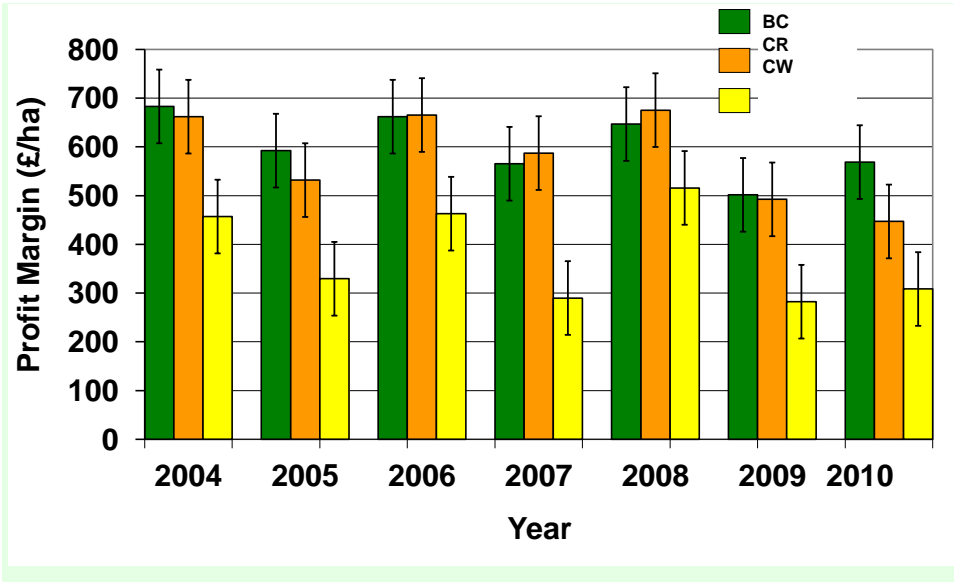


## Wheat Margin: Rotation (High Inputs)

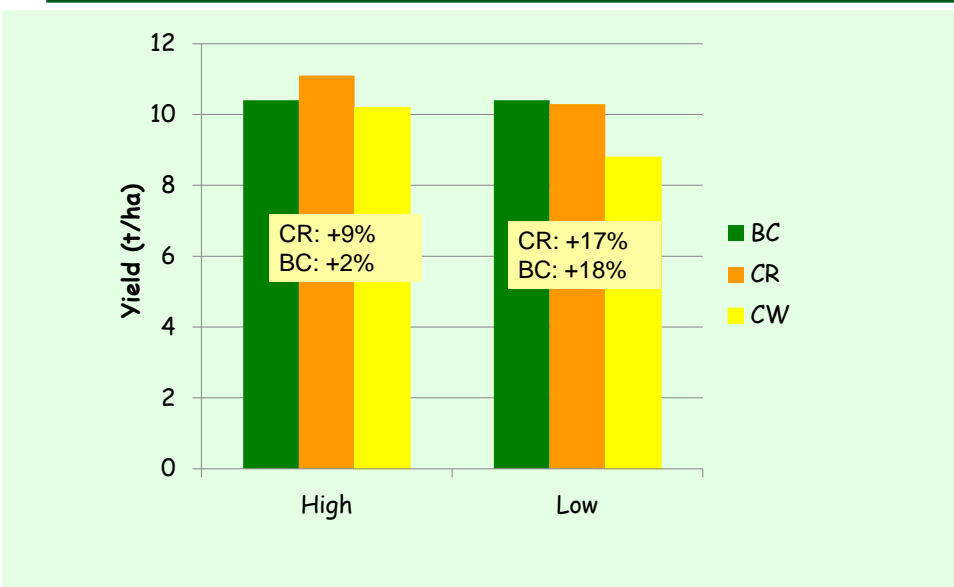




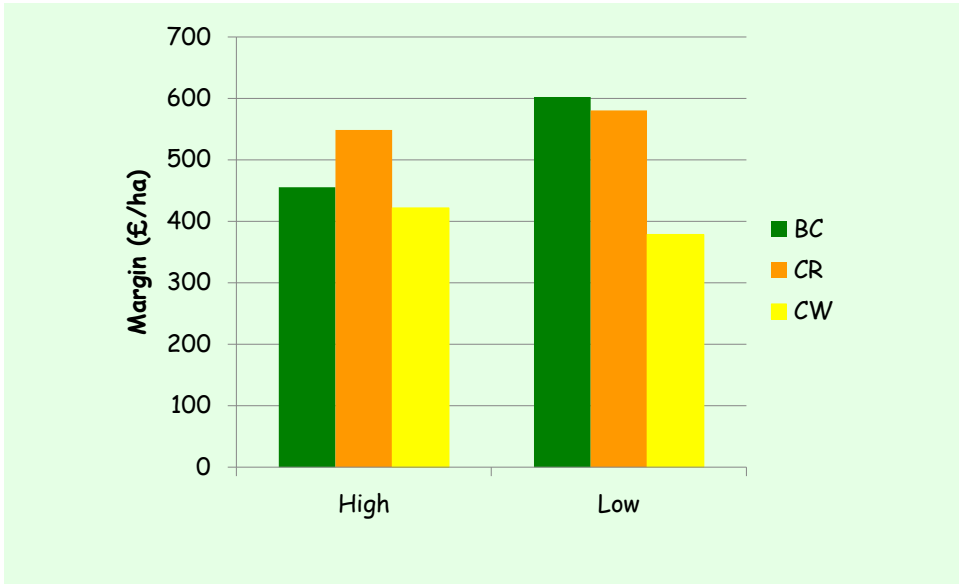
## Wheat Margin: Rotation (Low Inputs)



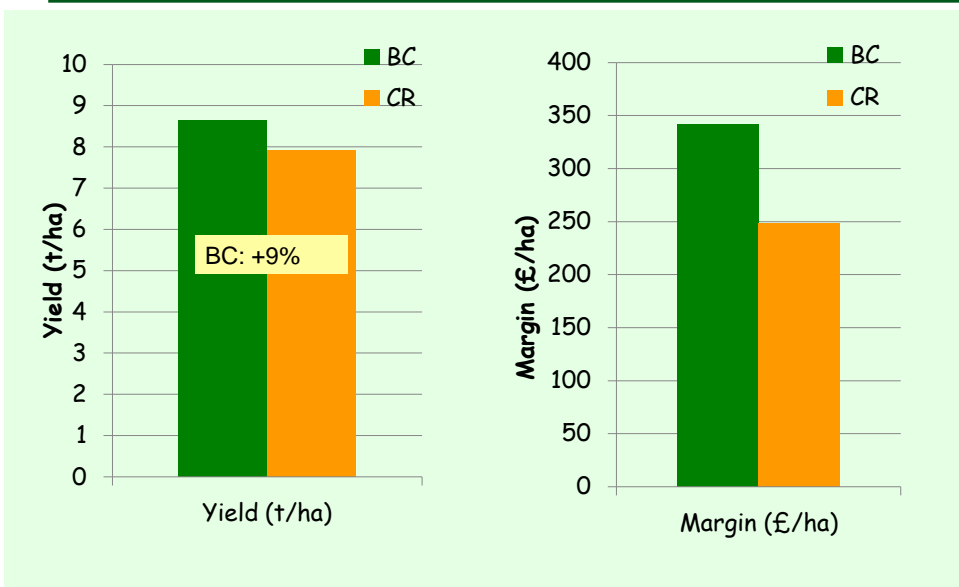
## Wheat Yield (t/ha): all years



## Wheat Margin (£/ha): all years

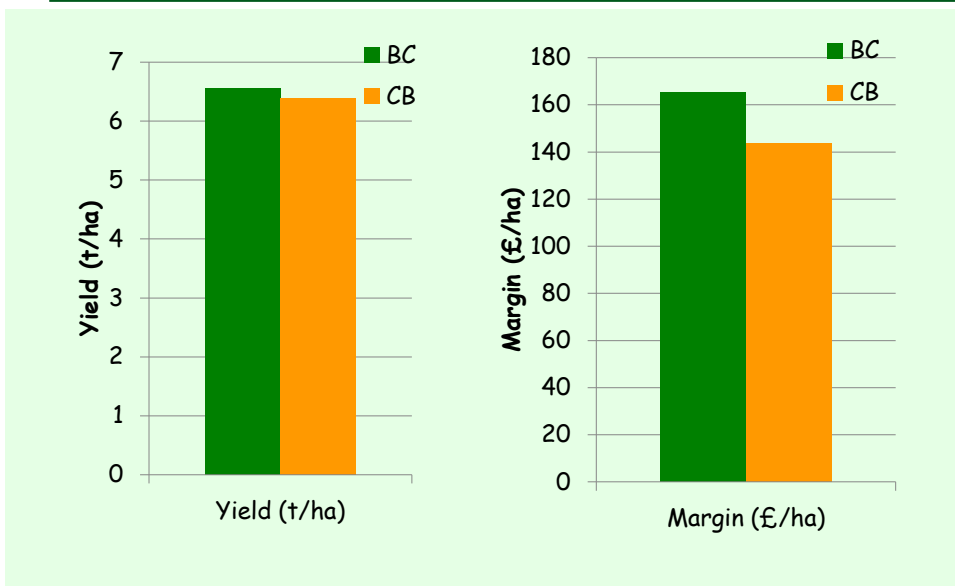


## W. Barley Yield and Margin: all years

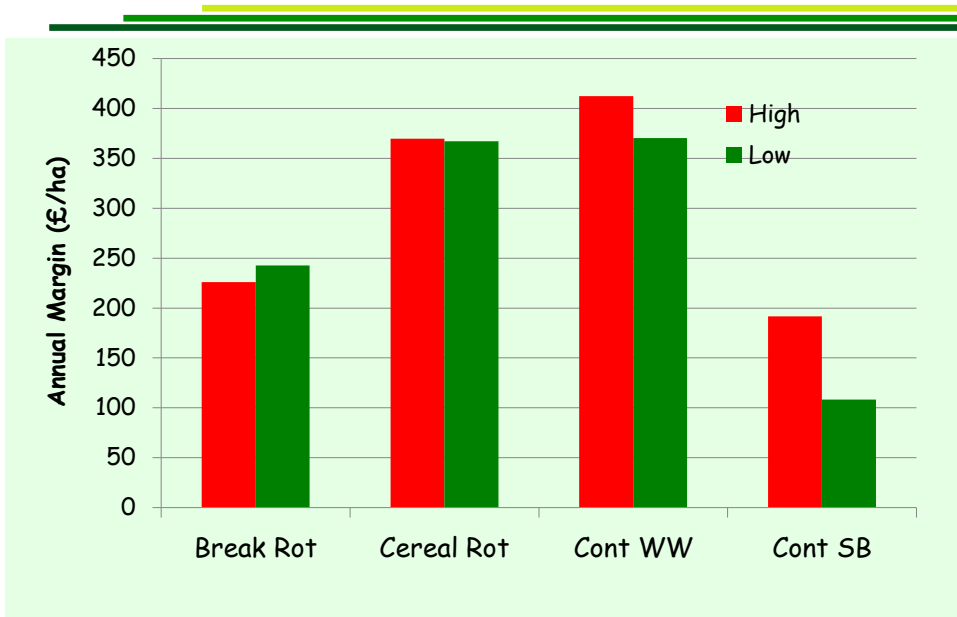




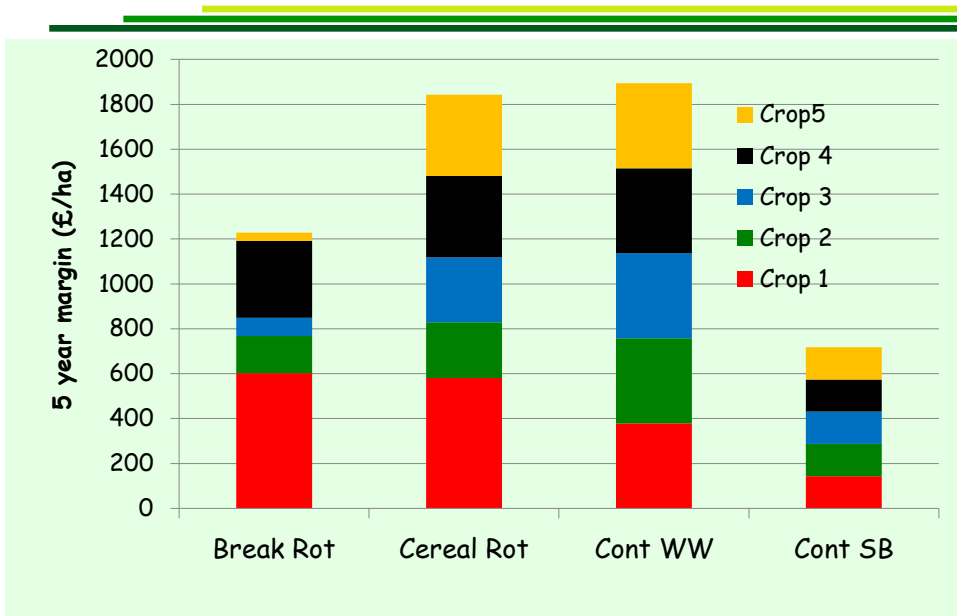
## Sp. Barley Yield and Margin: all years



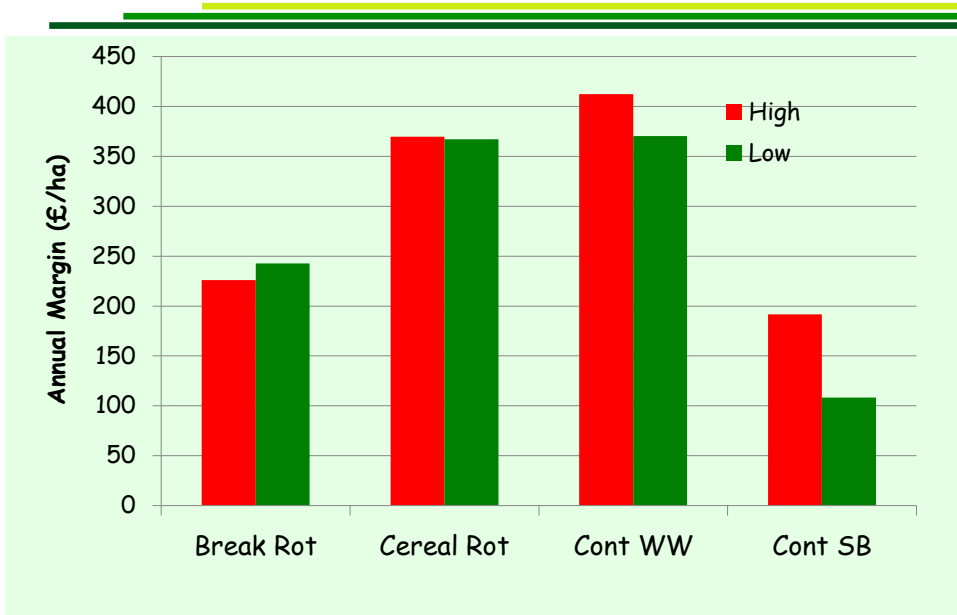
## Entire Rotations and Margin (£/ha)



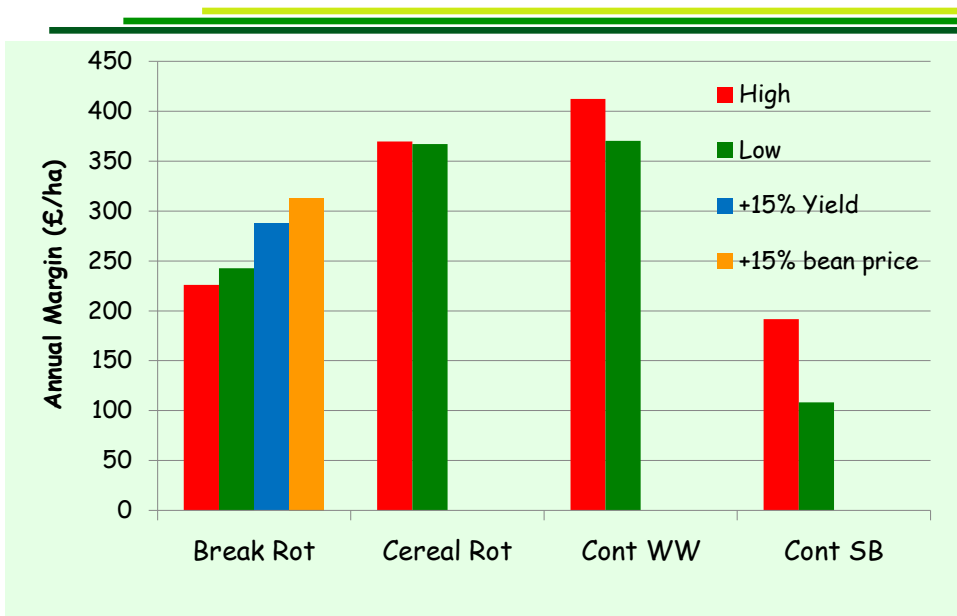
## 5 year Margin; Low input (£/ha)



## Entire Rotations and Margin (£/ha)



## 15% Yield + Price increase (£/ha)



## Summary

---

---

- Performance varies from year to year
- CR performed as well as or better than BC
  - ▶ Take -all effect
- Interaction (Wheat): Rotation and Input level
  - ▶ Low Inputs: Continuous Wheat suffered
- Rotation benefited Winter Barley
- Continuous wheat less profitable than rotation (single crop)
- Entire rotations: no profit benefit over CW

## 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
- Scope to reduce input costs with rotations
  
- Research needed on break crops
- Strong demand needed for Break crops

## Conclusions

---

---

- Must balance agronomic requirements with profitability.
- Choose component crops wisely
- Scope to reduce input costs with rotations
  
- Research needed on break crops
- Strong demand needed for Break crops