WP2
Winter wheat based rotations
–
Economic and environmental evaluation
of
IPM strategies

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Introduction

- Objectives and strategies
- Ex-ante assessment
  - DEXiPM
- Ex-Post assessment
  - Environmental assessment (SYNOPS, DEXiPM)
  - Economic assessment (cost-benefit-analyses)
- Take home messages

Objectives and strategies

- Objective:
  - ➢ assess the environmental and economic sustainability of the IPM strategies
- Methods:
  - – SYNOPS pesticide risk assessment on station experimentation
  - – Cost-Benefit-Assessment

  based on data generated in the on-station experiments
- Strategies

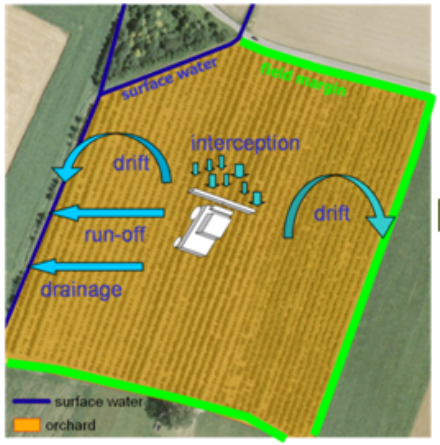
2012-14	Reference (CS)	Intermediate (IS)	Advanced (AS)
Balruddery (UK)	WW-WW-WSOR	SB-WW-WSOR	Pea-WW-WSOR
Flakkebjerg (DK)	WSOR-WW-WW	WSOR-WW-SB	WSOR-WW-SO
Winna Gora (PL)	WSOR-WW-WW	WSOR-WW-SB	WSOR-WW+cc-SB
Dahnsdorf (DE)	M-WW-WB	M+us-WW-WB	M+us-WW-WB+cc
Boigneville (FR)	SPea-WSOR-DW-SB-WW	BW-SL-DW-SB-WW	ALF-ALF-WW-SL-WFB-WW
Grignon (FR)	WSOR-WW-SPea-WW	WFB-WW-WSOR-WW-SB	SFB-WW-HE-TR-M-WW

Ex-ante and ex-post assessments

- Ex-ante assessment
  - first year ex-ante assessment with DEXiPM
  - annual regional stakeholder discussions
- Experimentation
- Ex-post assessments
  - Environmental evaluation
    - Environmental risk assessment (SYNOPS)
    - Environmental sustainability (DEXiPM)
  - Economic assessment
    - Cost – Benefit – Analysis (JRC)

Ex-post:
SYNOPS environmental risk assessment

- Comparison of pesticide use strategies under field based environmental conditions
- Based on application scenarios of on-station experiments



New:
Leaching to groundwater included in SYNOPS

Exposure
soil
surface water
field margins

Toxicity
earthworm
daphnia, algae, fish, lemna, chironomus
bee, other arthropods

active ingredient database
a.i.1 LC50 ;NOEC
a.i.2 LC50 ;NOEC
.....

$$\text{Risk (ETR)} = \frac{\text{calculated Exposure}}{\text{Toxicity}}$$

model application within PURE

RESULTS

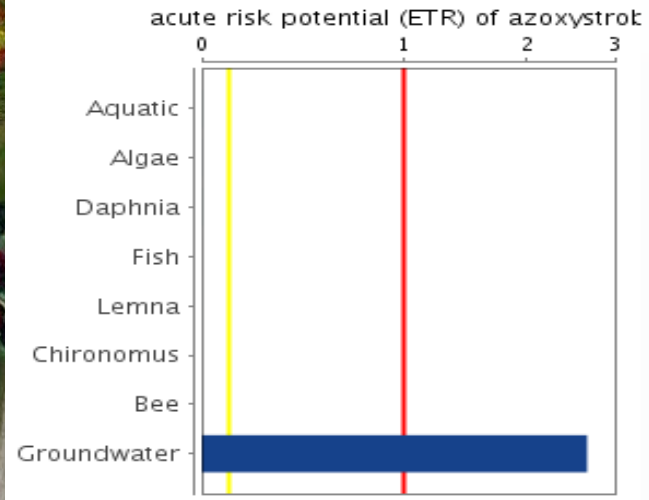
Four risk categories for		acute risk	chronic risk	groundwater	
very low risk		ETR<0.01	ETR<0.1		
low risk		0.01<ETR<0.	0.1<ETR<1	ETR<1	no risk
medium risk		0.1<ETR<1	1<ETR<10	1<ETR<10	medium risk
high risk		ETR >1	ETR >10	ETR >10	high risk

Ex-post:
SYNOPS: Results

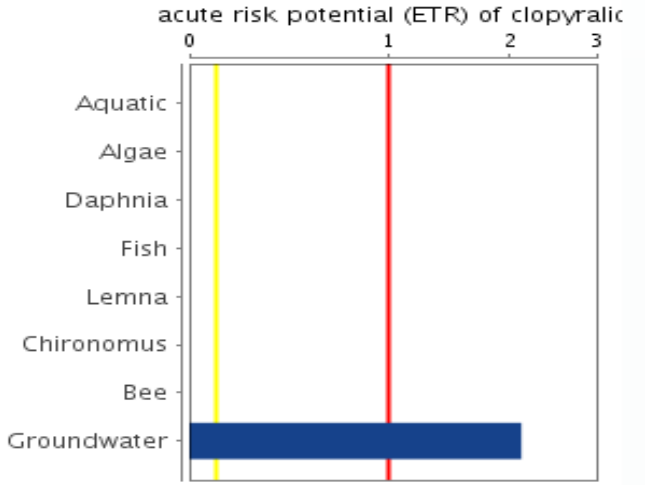
- scenarios assumed 1m distance to water courses and neglected product related distance provisions

2012-14	Risk aquatic organisms		Risk groundwater	
	acute	chronic	acute	chronic
Dahnsdorf	CS>IS>AS	CS>AS>IS	CS>IS>AS	CS>IS>AS
Flakkebjerg	CS>IS>AS	CS>AS>IS	CS>AS>IS	CS>AS>IS
				CS>IS

azoxystrobin



clopyralid

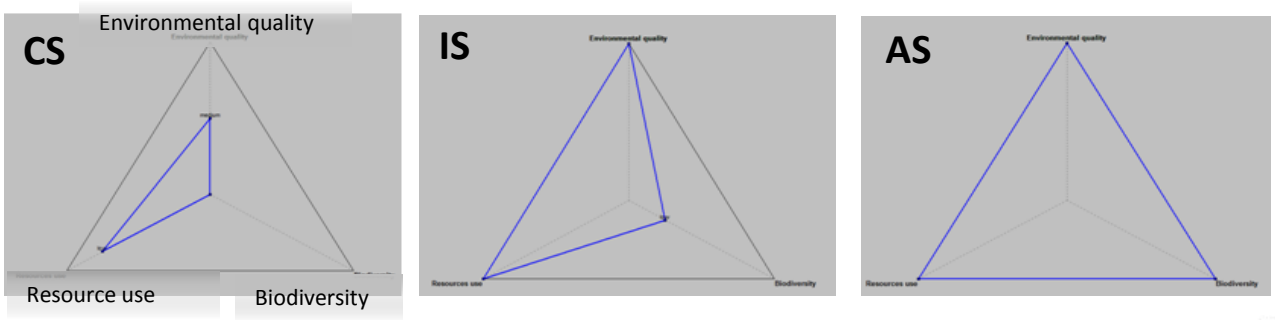


Four risik categories
very low risk
low risk
medium risk
high risk

Ex-post:
DEXiPM - environmental sustainability

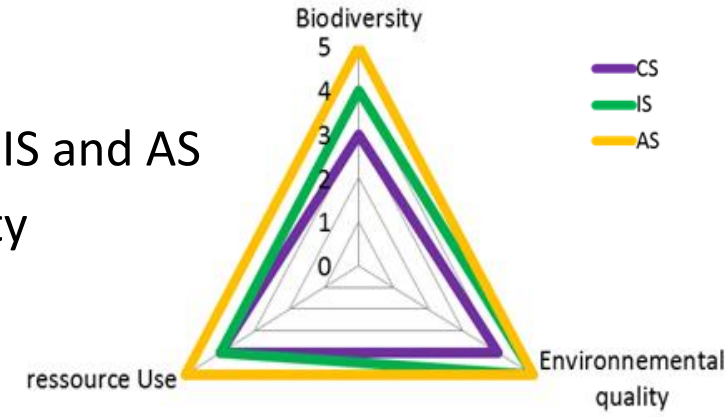
Grignon – INRA (2012-14)

- environmental sustainability increases **CS** (medium) to **IS**, **AS** (very-high)
  - Sustainability of resource use: **CS** (high) to **IS** and **AS** (very-high)
  - Environmental quality: **CS** (medium) to **IS** and **AS** (very-high)
  - Aerial, above-soil biodiversity: **CS** (very-low) to **IS** (low) to **AS** (very-high)



Boigneville – Arvalis (2012-14)

- environmental sustainability increases CS to IS and AS
  - IS: biodiversity and environmental quality
  - AS: for all 3 attributes



Ex-post:
Cost – Benefit – Analysis

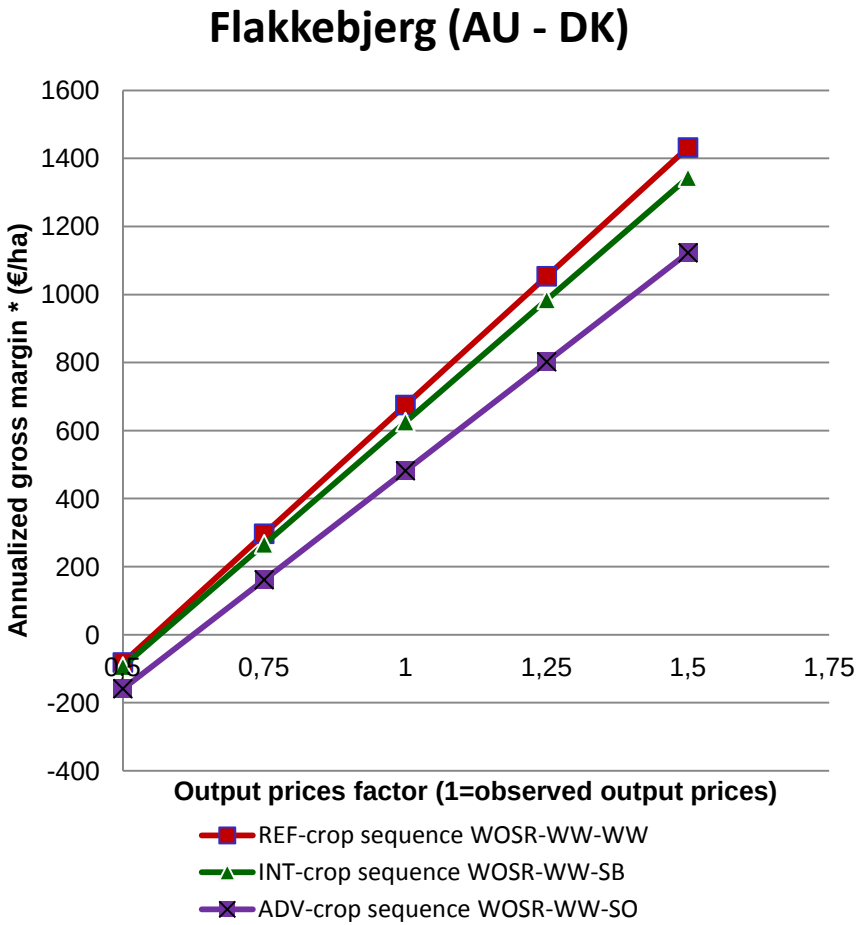
- Methods:
  - Annual economic assessment for each IPM system (rotation)
  - Financial evaluation of cost and benefits at farm level
  - Complete CBA

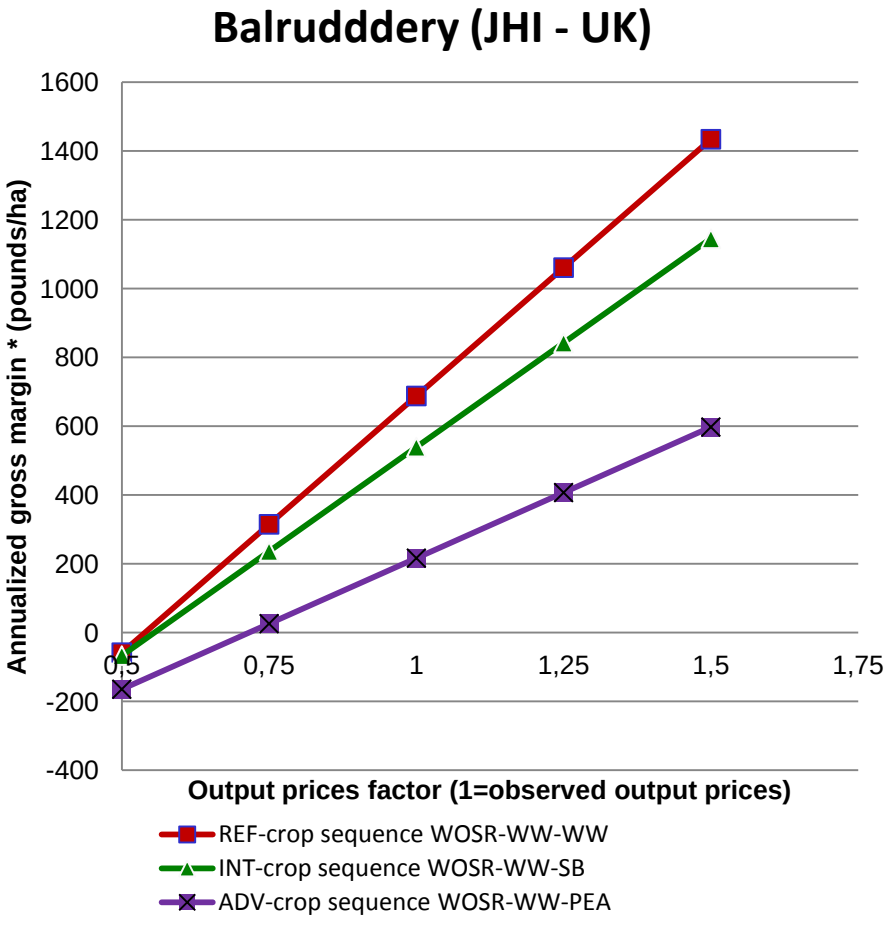
  ✓ Costs:
    - information on real costs is collected for all variable inputs
    - for operations contractor charges at regional level are used

  ✓ Benefits:
    - prices do not reflect national market prices but real crop prices, or the price usually paid in the region (if their output is not sold)

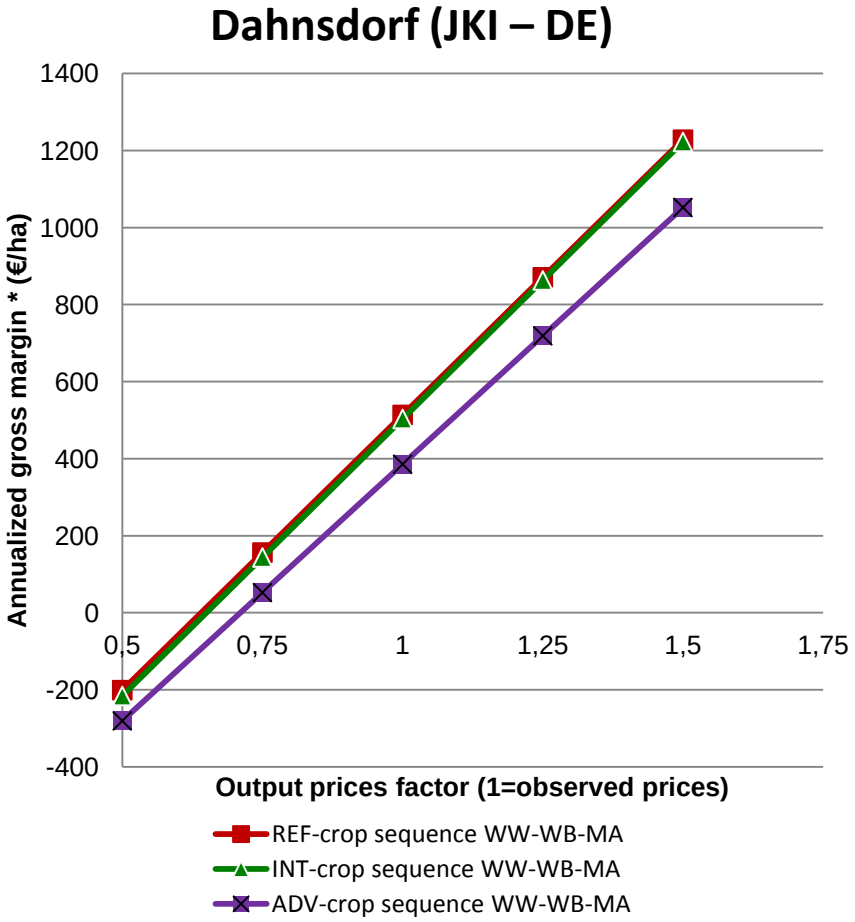
- Results:
  - annualized gross margin (averaged net gross margin and crops 2012-14)

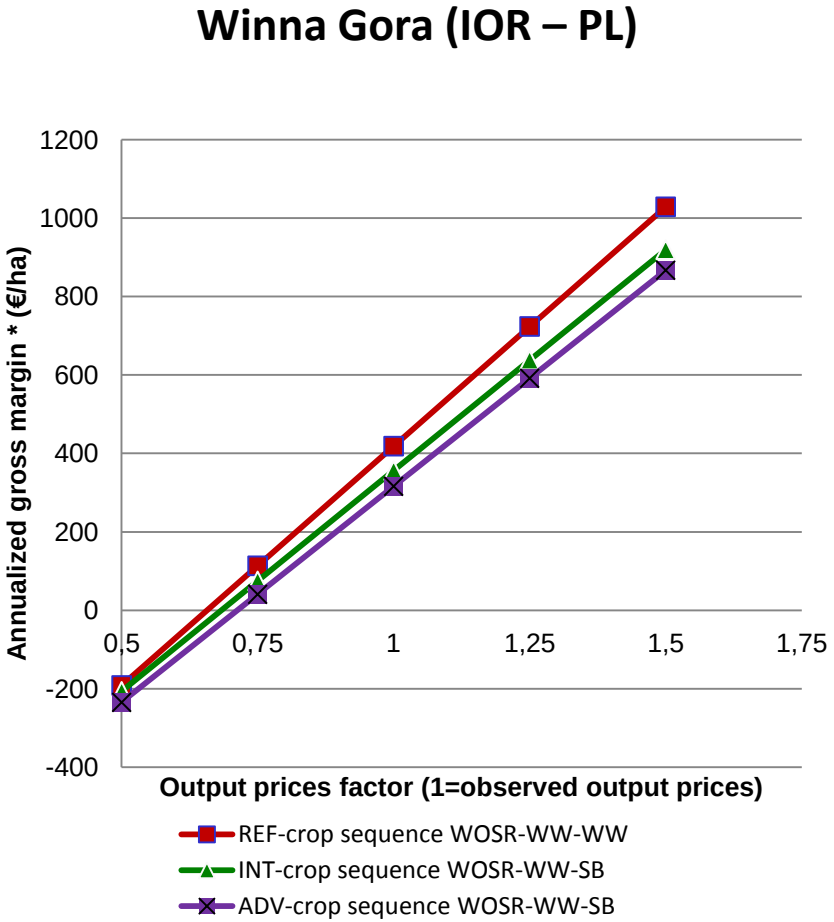
Ex-post:
CBA - Annualized gross margin



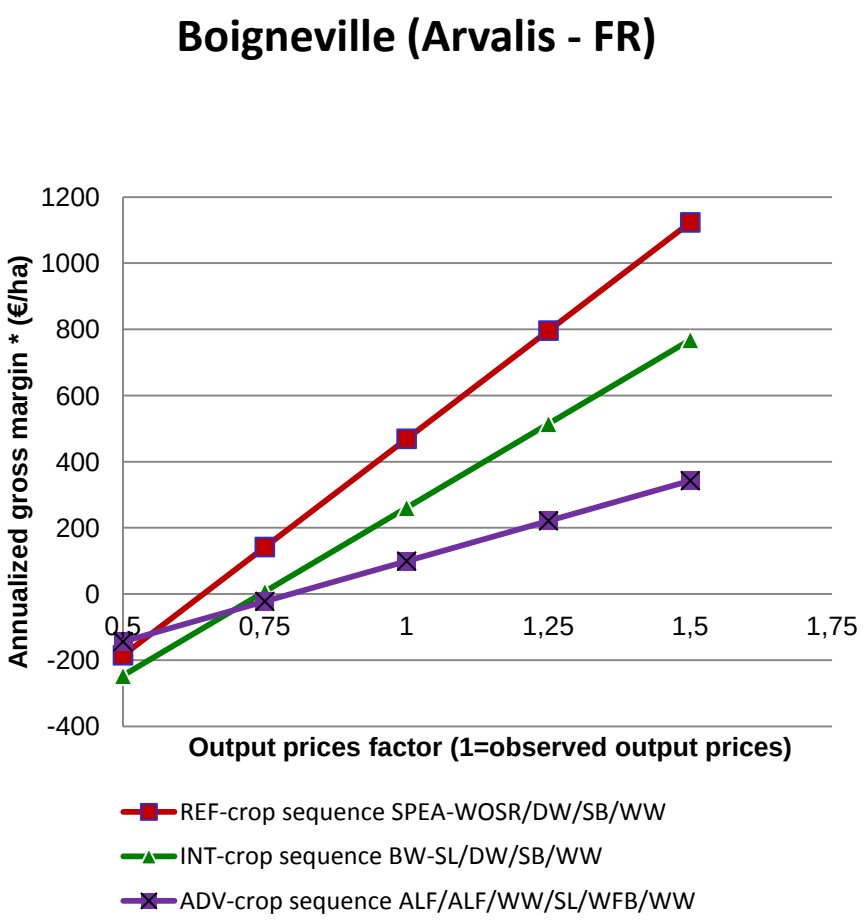


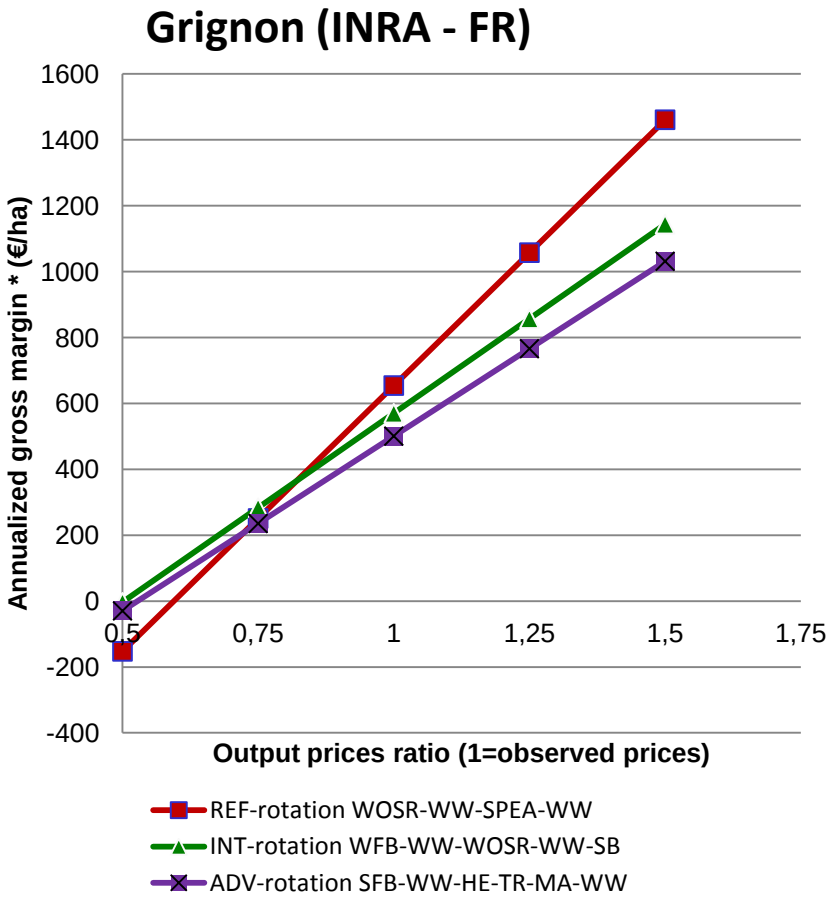
Ex-post:
CBA - Annualized gross margin



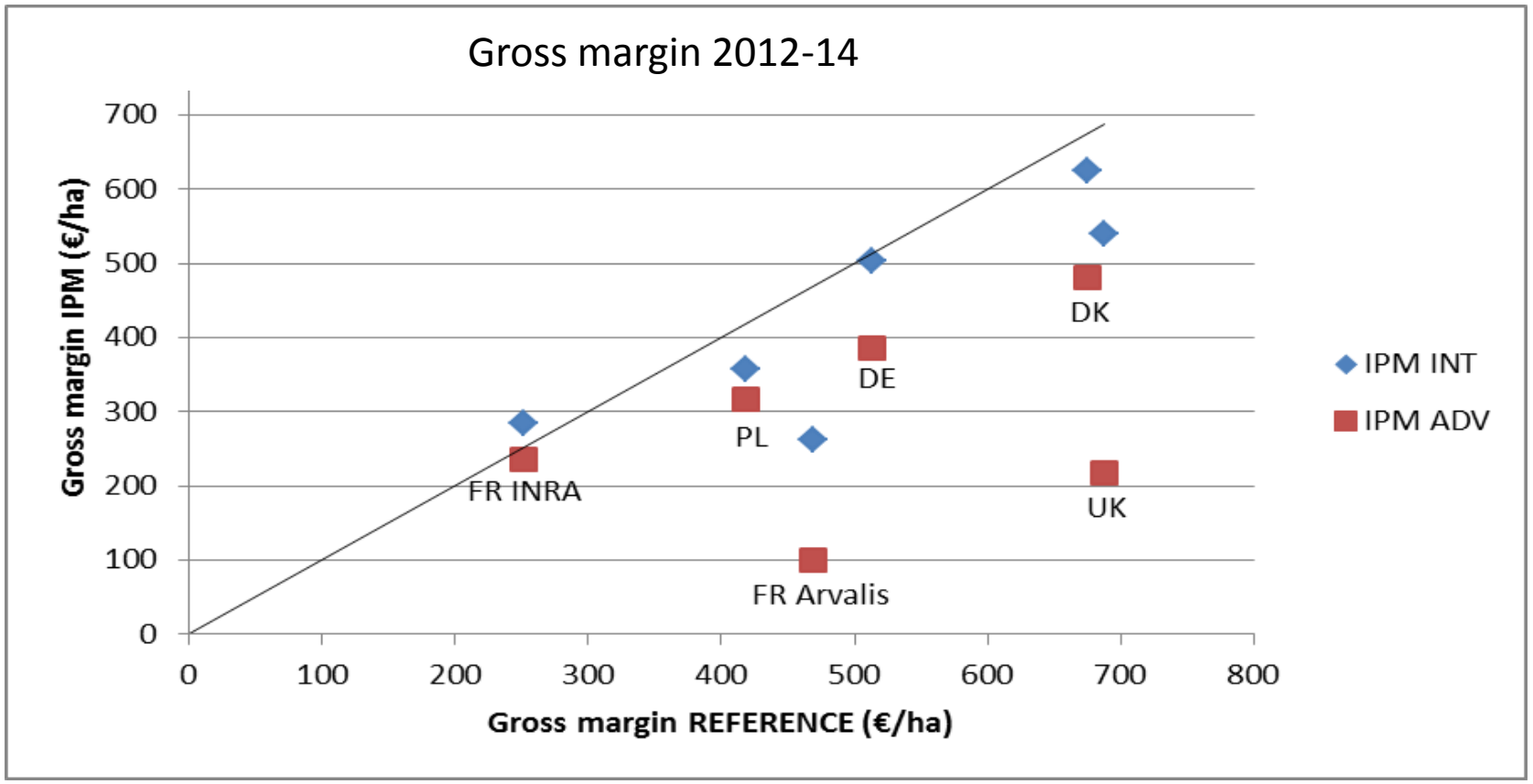


Ex-post:
CBA - Annualized gross margin





Ex-post:
CBA – Gross margin



- Small reduction of IS (INT) gross margin compared to CS (REF)
- Considerable reduction of AS (ADV) compared IS and CS

… in a nut shell

- Environmental risk assessment
  - Shows across the analysed regions reduced risk potentials of both the IS and the AS compared to the CS
    - essential is pesticide selection rather than the dose rate
    - reduced pesticide dose rates can contribute to a risk reduction

- Economic assessment

  Compared to optimised CS both the IS and the AS have lower gross margins,
    - lower yields which are not compensated by lower costs and/or
    - IPM premium prices

Thank you for your attention!

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Ex-post:
DEXiPM - environmental sustainability

- INRA
- UK

JHI ex-post-2013