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Model-based assessment of economic and ecological indicators based on German FADN-data

7th meeting of OECD network for farm level analysis, Paris

Structure

1 Introduction

2 Selection and calculation of indicators based on FADN data

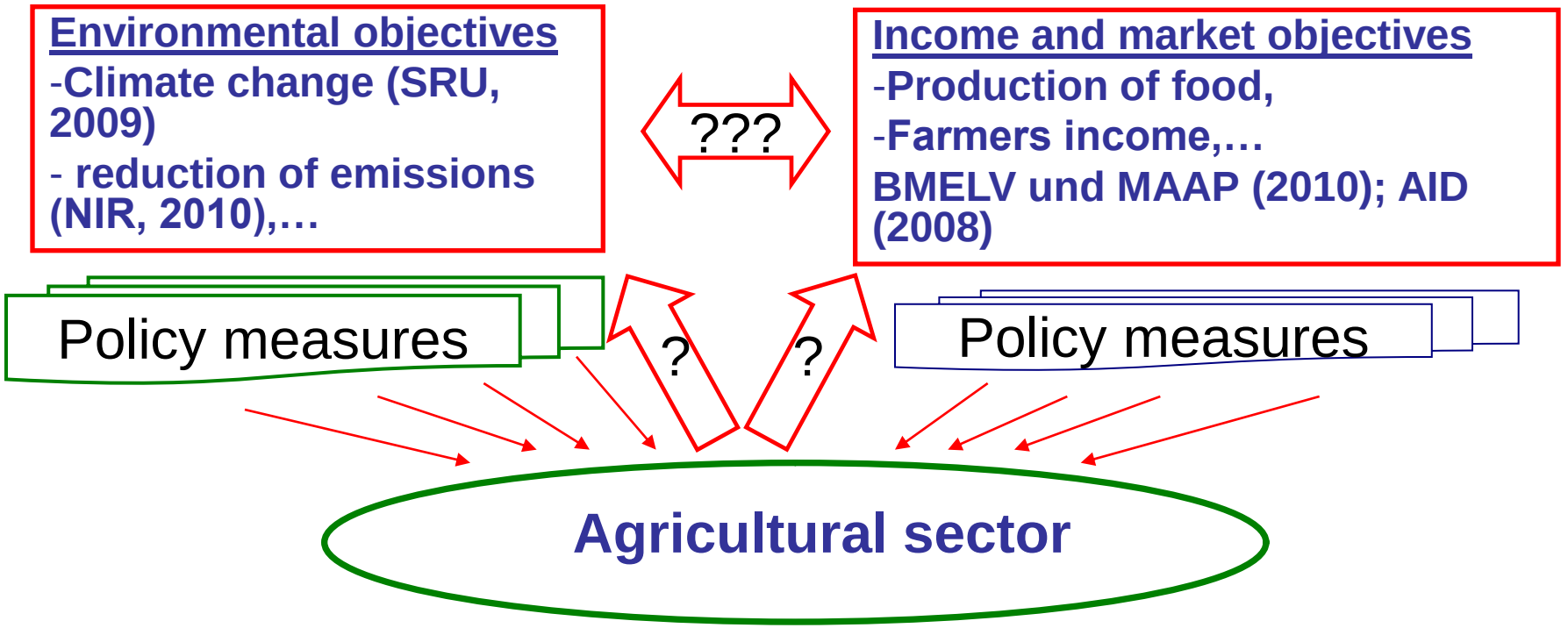
3 Farm Modelling and Information System (FARMIS)

4 Database: stratification and scenarios

5 Results

6 Conclusion

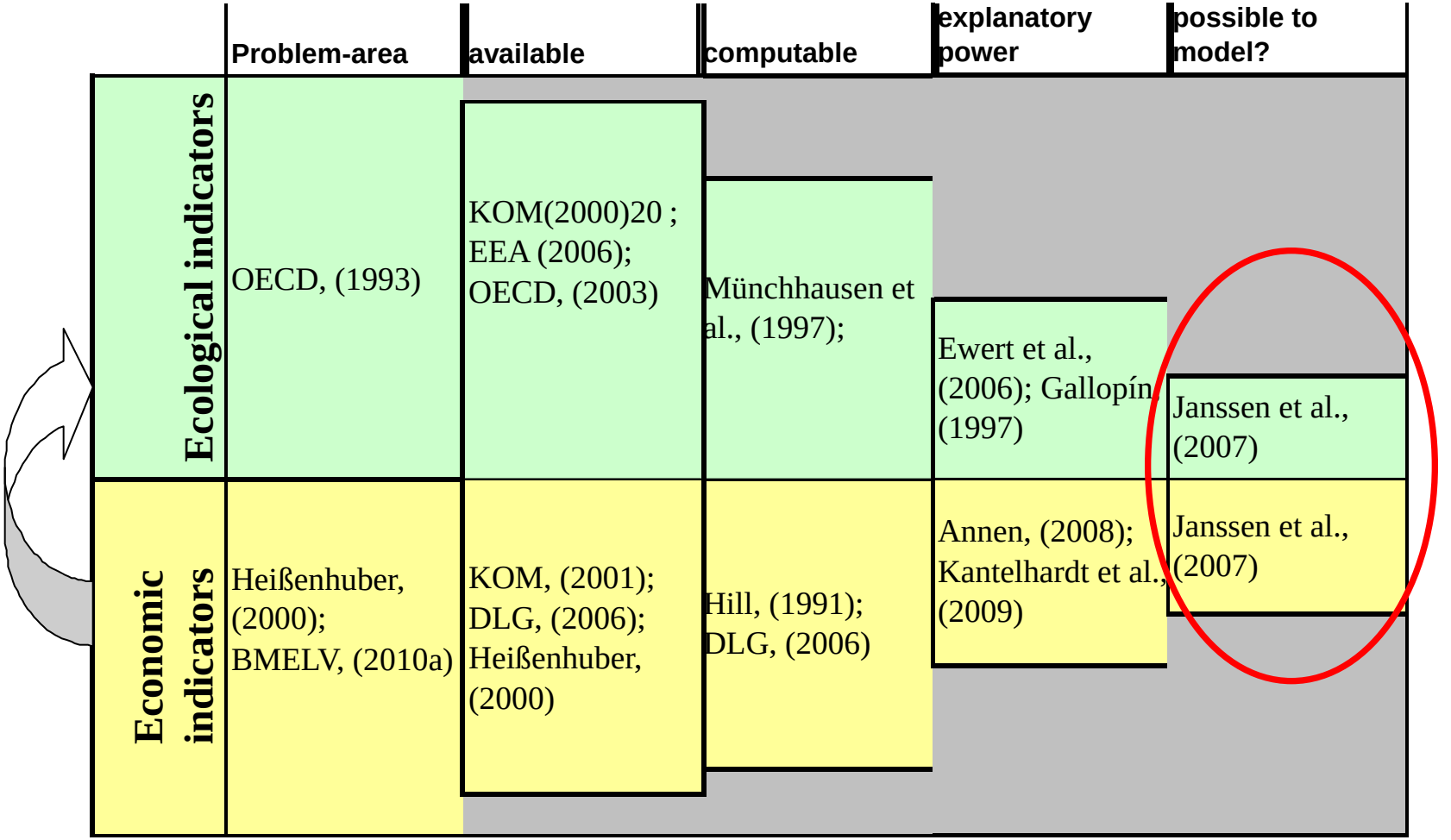
1. Introduction



➔Simultaneous analysis of ecological and economic impacts of various policy scenarios

➔Based on German FADN data

2. Selection and calculation of indicators based on FADN data



Considered indicators

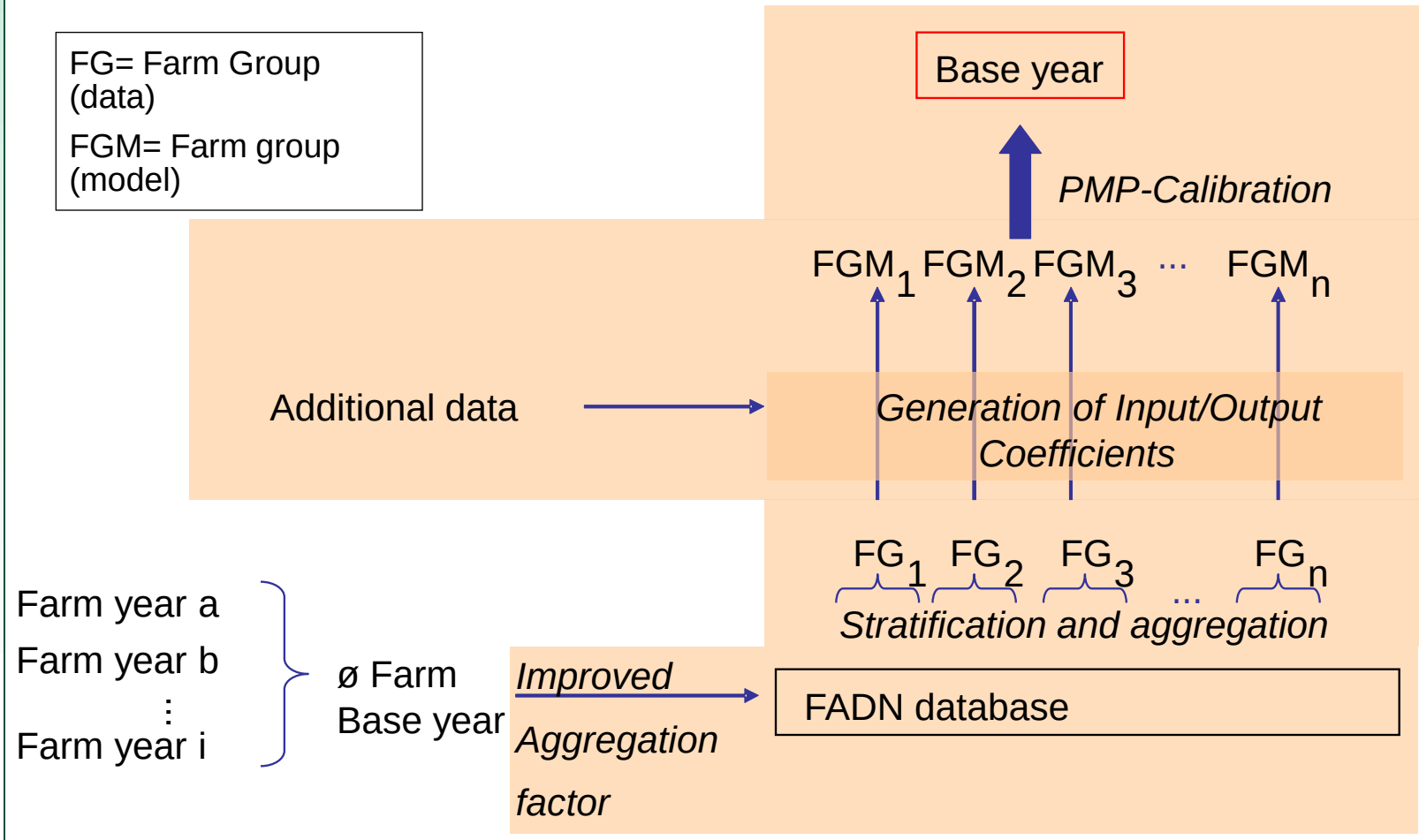
Ecological indicators

- Nutrient balances (eutrophication…)
- Humus balance (soil fertility)
- Ammonia emissions (eutrophication)
- Shannon Index (biodiversity)
- (Energy use)

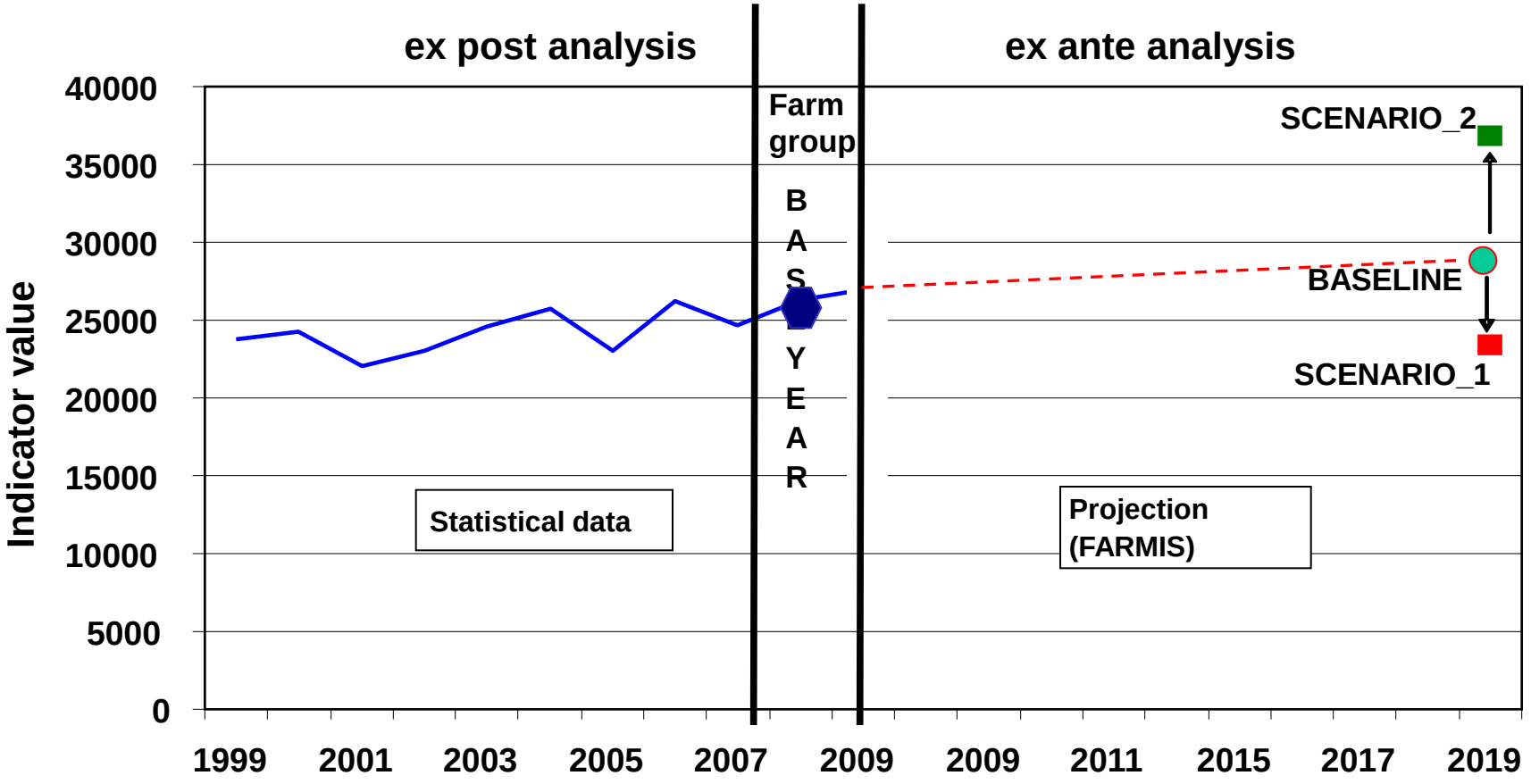
Economic indicators

- Production Value
- FNVA/ha
- Family Farm Income (FFI) + labour costs /Agricultural working unit (AWU)

4. FARm Modelling and Information System (FARMIS) (Calibration step)



Scheme of policy analysis with FARMIS (scenario analysis)



4. Database and stratification

Application on the German farm sector (8566 FADN farms)

- → **representing 228,000 farms**
- → **accounting years 2005/06 - 2007/08**

Stratification:

Region, farm type, size

- → **630 farm groups**

Considered scenarios (projected to 2019)

Baseline	**Projected framework conditions (CAP, Health Check) for the target year 2019. Used as reference for comparison of scenarios**
RedN15	**Reduction of N-surplus by 15% (if N-surplus of farms is > 50 kg N/ha)**
DP-50	**Reduction of direct payments by 50%**
HighP	**Increase of prices for animal and crop products, feedstuff and fertiliser between 2 % and 50 %**
LowP	**Decrease of prices for animal and crop products, feedstuff and fertiliser between 4 % and 25 %**

5 Results

Results on sector level

	Baseline	RedN15	DP-50	HighP	LowP
		change in % to Baseline			
Income (Bn €)					
FNVA	13,4	-8	-19	31	-25
Total Subsidies	6,5	-4	-40	0	-3
Land use (million ha)					
Cereals	6,9	8	-6	5	-9
Oilseeds	1,4	-42	-10	10	-5
Crop intensities (million ha)					
high	3,4	-24	-5	14	-12
low	3,4	19	-6	-5	-1
Livestock (million units)					
Dairy cows	4,2	-10	-1	6	-13
Pigs	19,2	-10	0	0	5

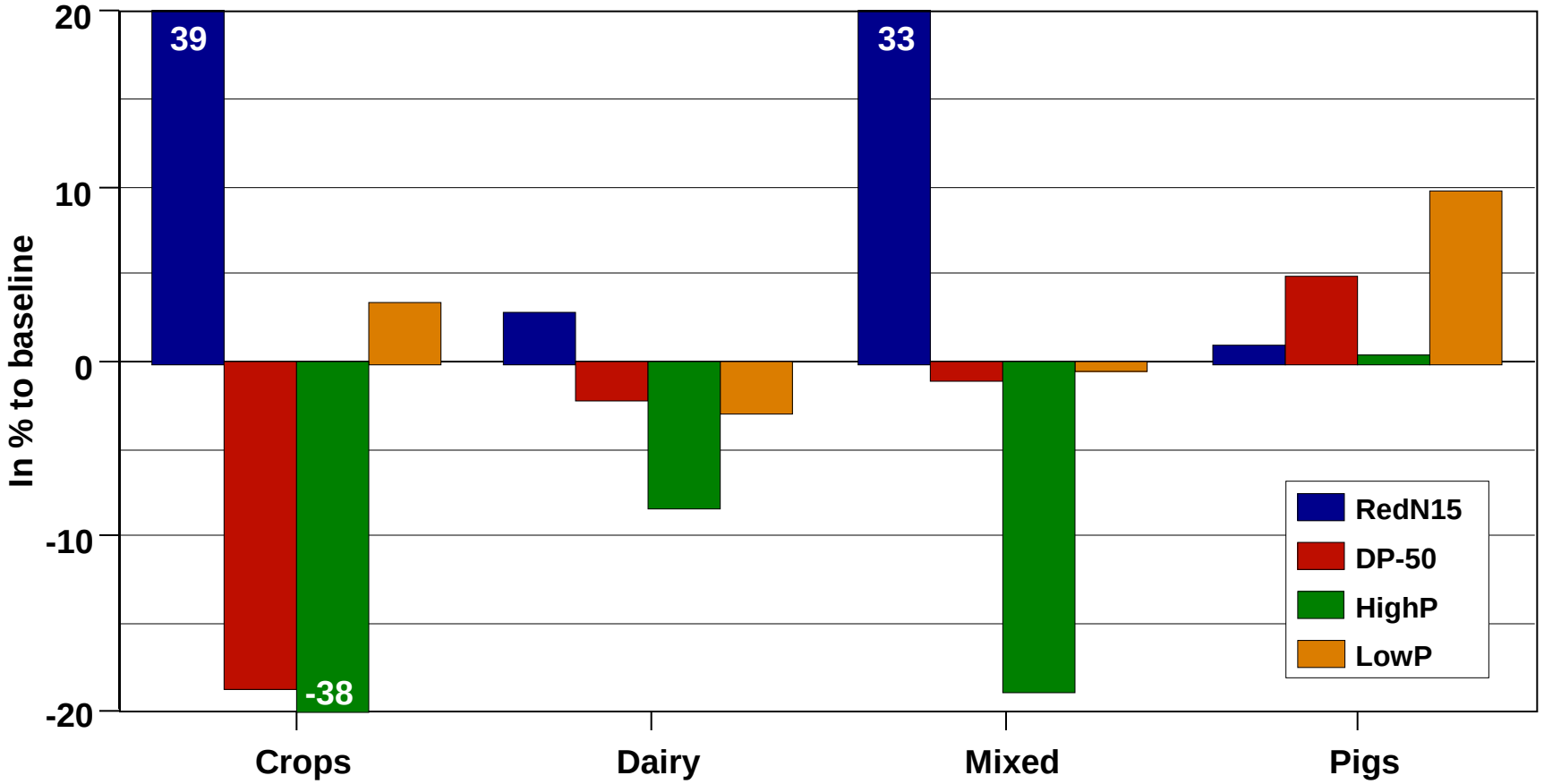
Source: Qwn calculations based on FARMIS 2010

Economic and ecological indicators

	Baseline	*RedN15*	*DP-50*	*HighP*	*LowP*
		change in % to Baseline			
Ecological indicators					
Nitrogen balance (kg/ha)	97	***-12***	***1***	***2***	***0***
Humus balance (kg/ha)	94	***15***	***-2***	***-13***	***2***
NH_3 emissions (kg/ha)	28	***-11***	***4***	***-1***	***0***
Shannon-Weaver-Index	2,25	***1***	***6***	***-1***	***5***
Economic indicators (T €/AWU)					
Farm **F**amily **I**ncome + labour costs	32,9	***-2***	***-11***	***22***	***-21***

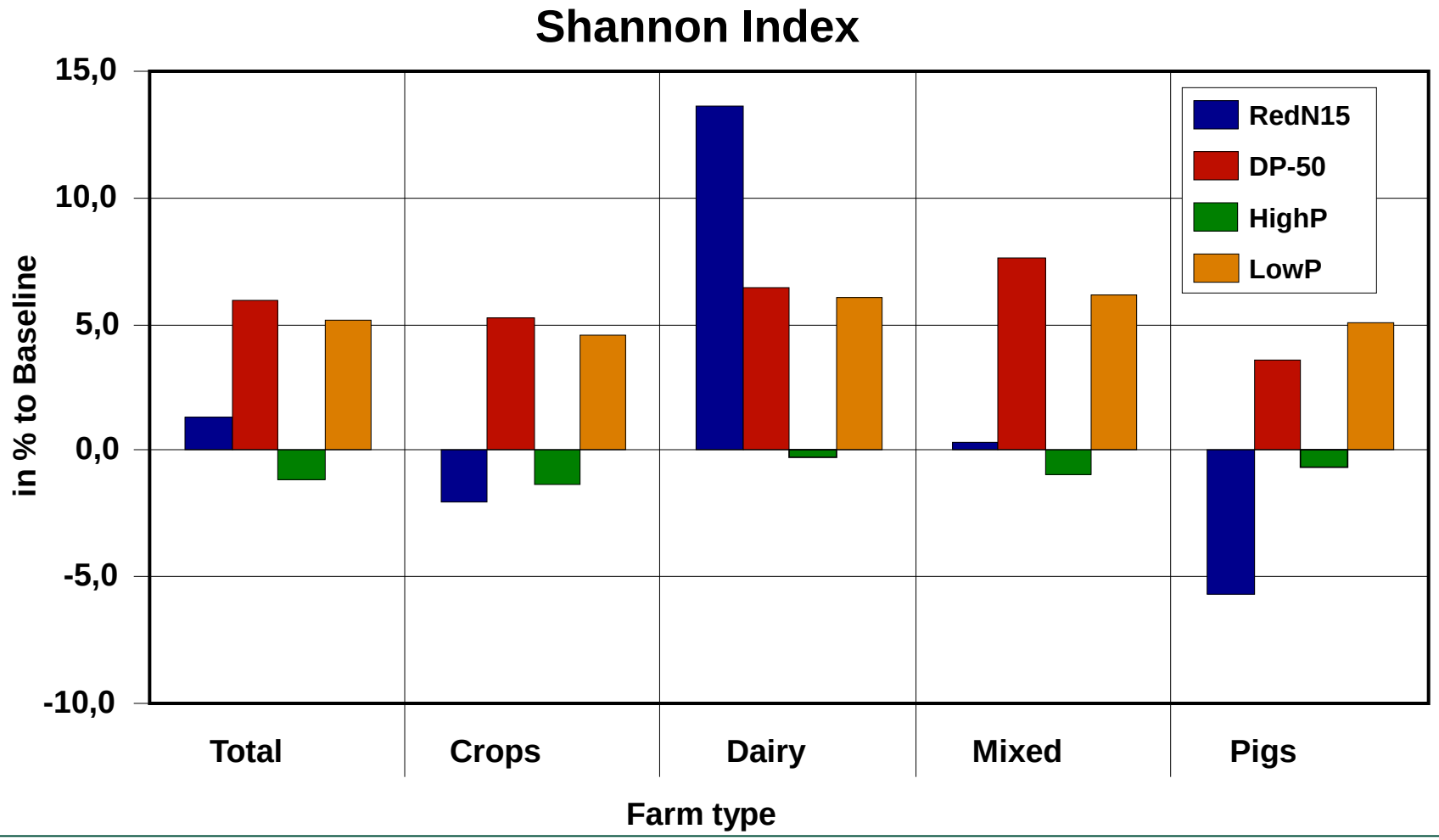
Source: Own calculations based on FARMIS 2010

Humus balance by farm types



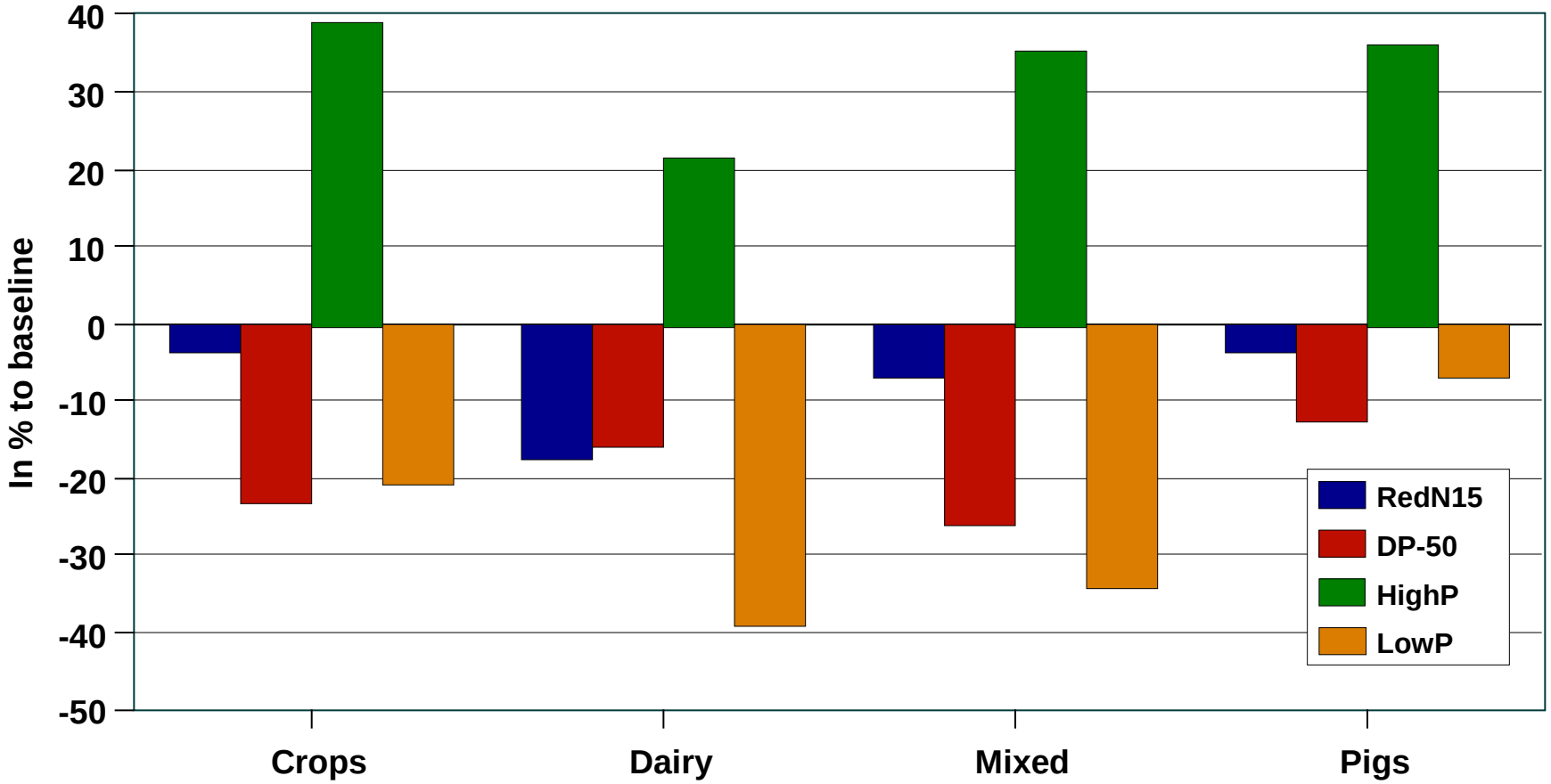
Source: Own calculations based on FARMIS 2010

Shannon Index by farm types



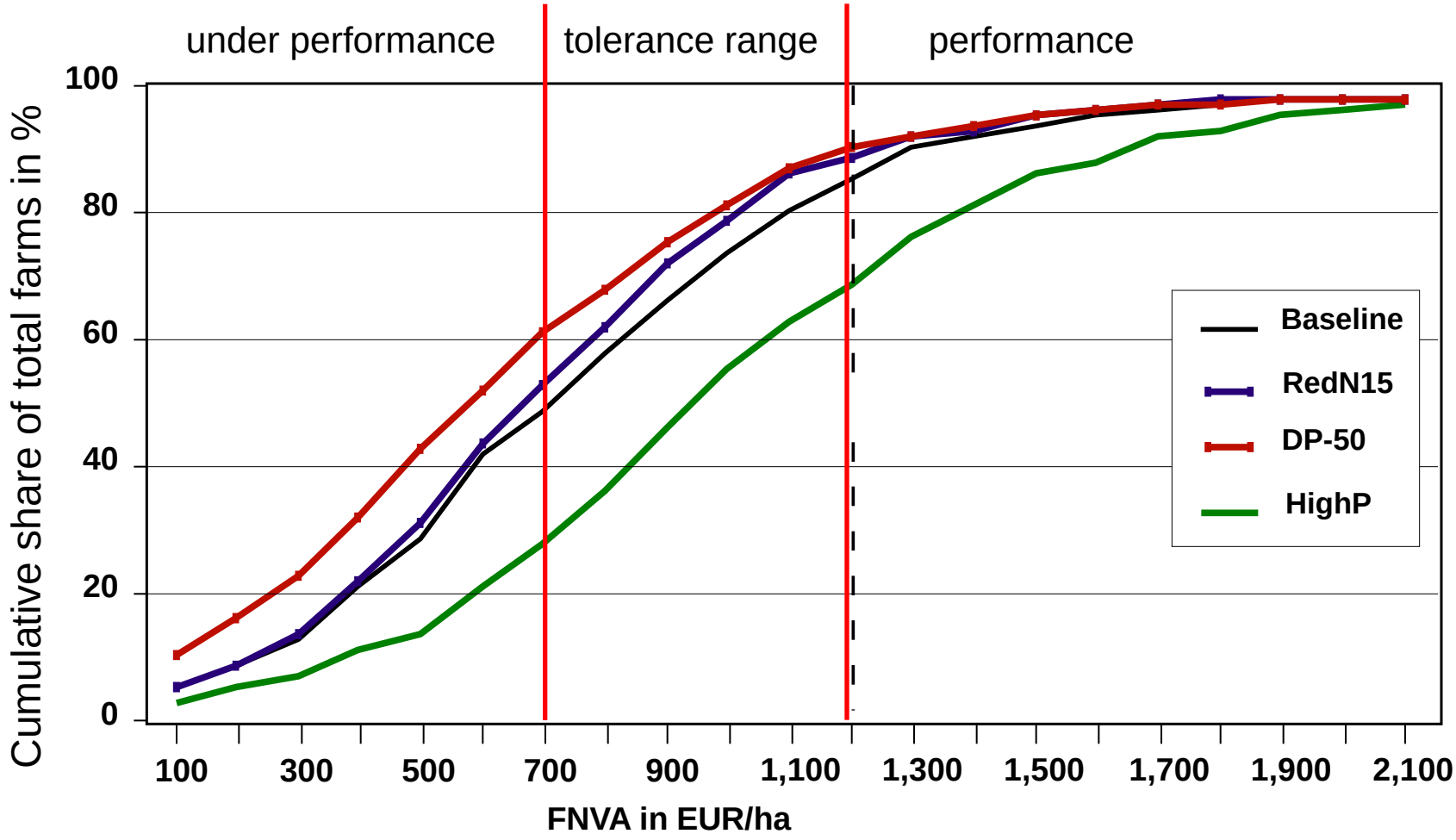
Source: Own calculations based on FARMIS 2010

FNVA by farm types



Source: Own calculations based on FARMIS 2010

Economic situation of farms (FNVA/ha) based on KSNL- classification (Breitschuh 2005)



Source: Own calculations based on FARMIS 2010

Summary

Reduction of direct payments:

- Negative income effects (crop and mixed farms)
- Most environmental indicators change in direction of lower performance, but crop diversity increases.

Reduction of N-surplus:

- Impacts especially on livestock keeping
- Increase of less intensive crop production

Higher prices:

- Positive income effects (crop, mixed and pig farms)
- Lower environmental performance

Lower prices:

- Effects are vice versa
- Especially economic situations of dairy farms are negative affected

Conclusions

- FARMIS allows the simultaneous assessment of economic and ecological indicators for various policy scenarios
- A rather realistic adaptation behaviour is achieved by considering different intensity variants

Further research:

- Modelling further adaptation possibilities for farms
- If impacts of farther reaching restrictions or targets are analysed, inter-farms changes must be considered

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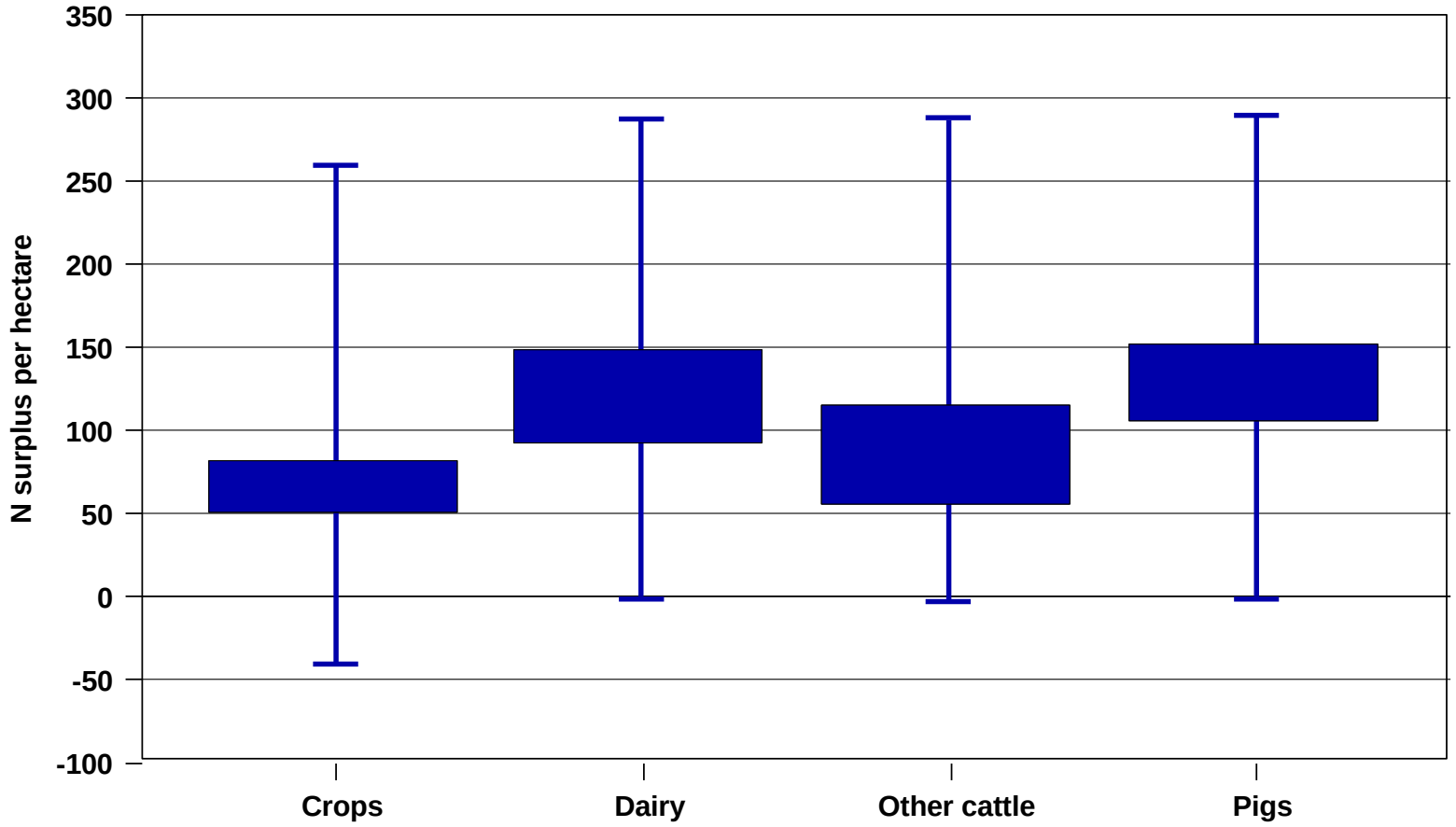
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Annex

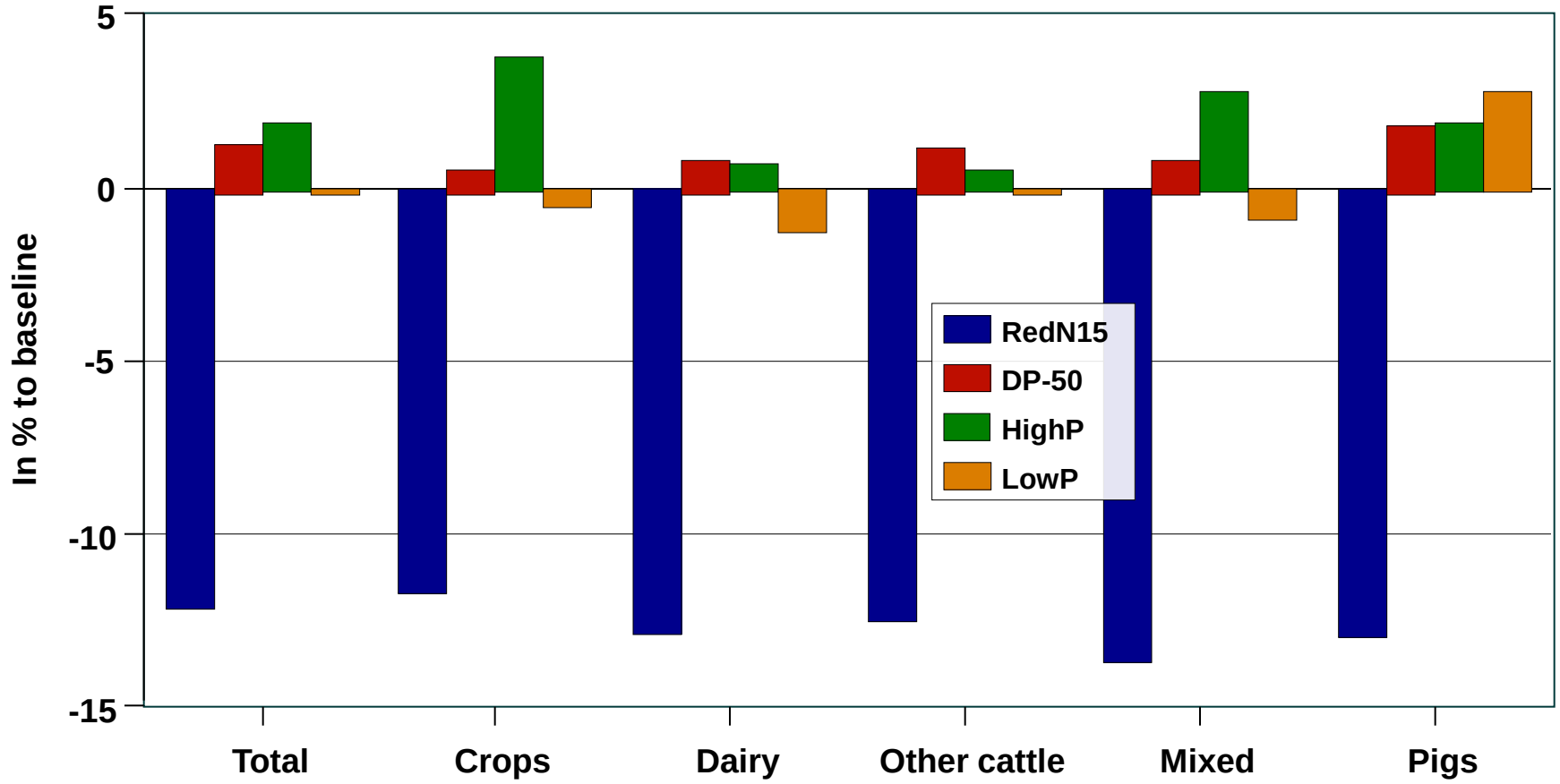
Box plot by different farm types (N surplus / ha)[1]



1) Outliers not deleted

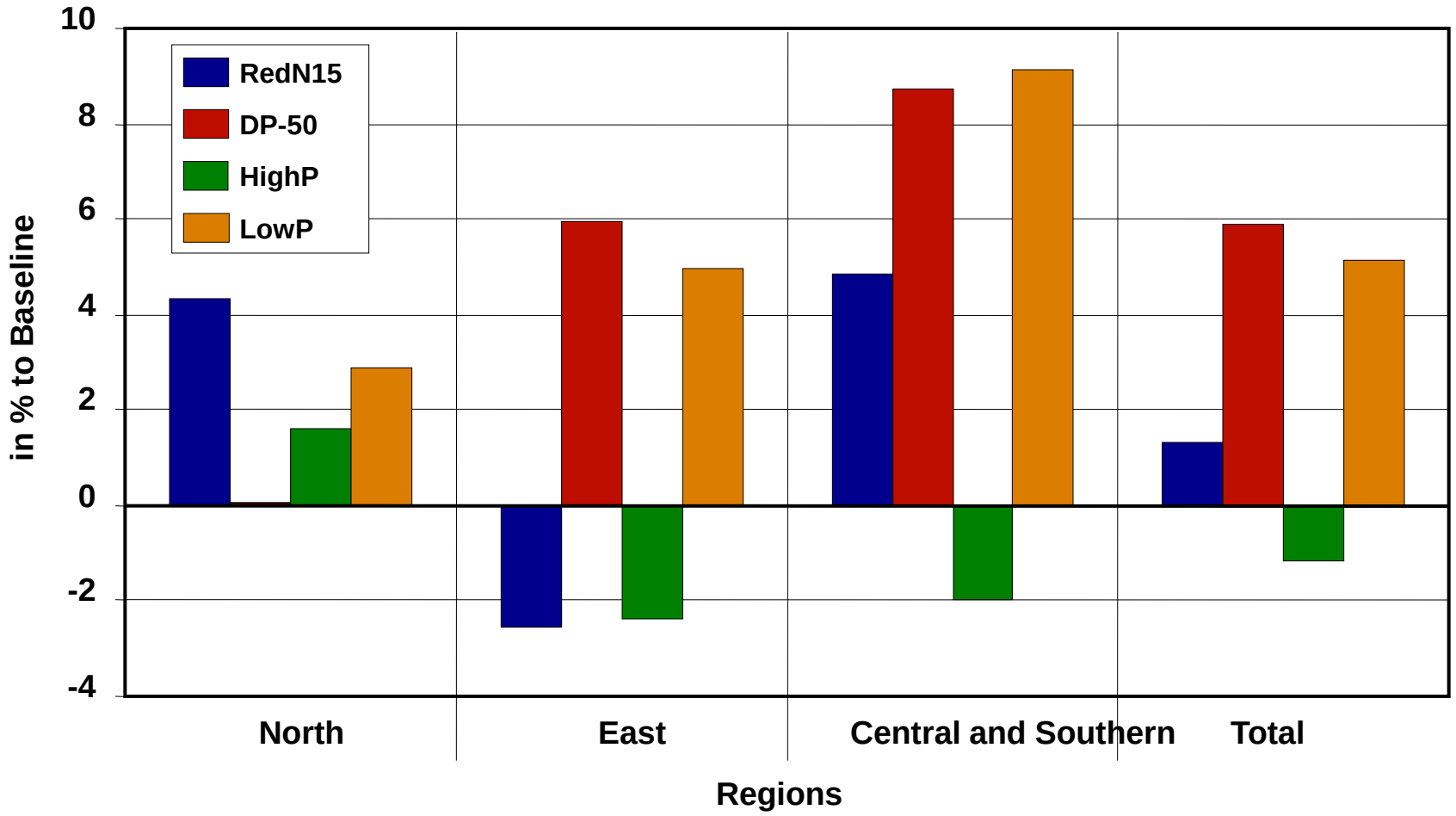
Source: Own calculations based on FARMIS 2010

N balance by farm type



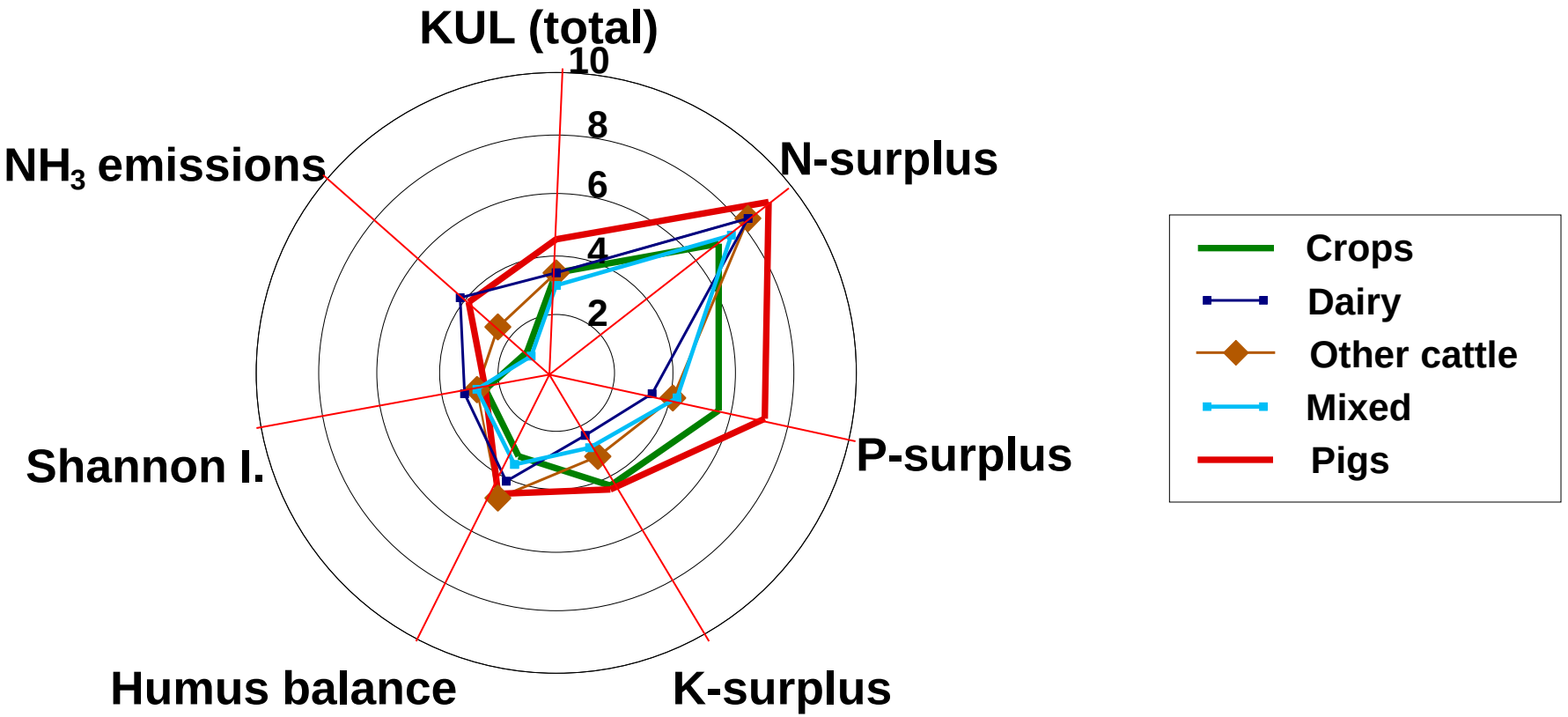
Source: Own calculations based on FARMIS 2010

Shannon Index by region



Source: Own calculations based on FARMIS 2010

KUL rating for different indicators in the Baseline by different farm types



Source: Own calculations based on FARMIS 2010