Amino acid incorporation in feeds reduces the environmental impacts of pig production

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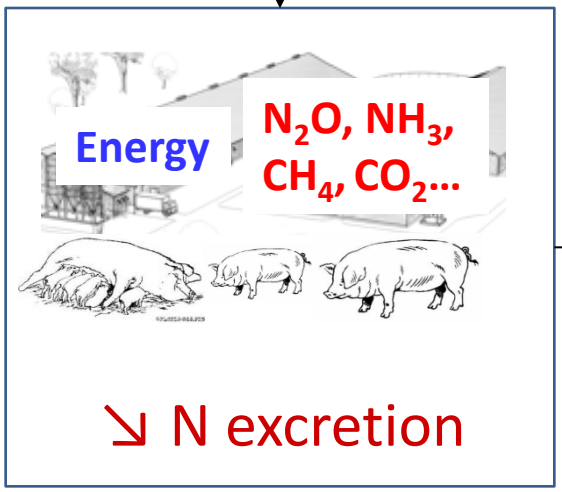
Low protein diets balanced in essential amino acids

↘ soybean meal incorporation
↘ of impacts
(Mosnier et al. 2011)



↘ N excretion

Without changing feed intake, feed conversion ratio and weight gain

↘ N2O and NH3 emissions

Bourdon et al. 1995; Portejoie et al. 2004; Quiniou et al. 2011; Osada et al. 2011

AIM OF THE STUDY

To estimate through Life Cycle Assessment (LCA) the environmental impacts of the production of 1 kg live pig according to different modalities of feed-use amino acid incorporation

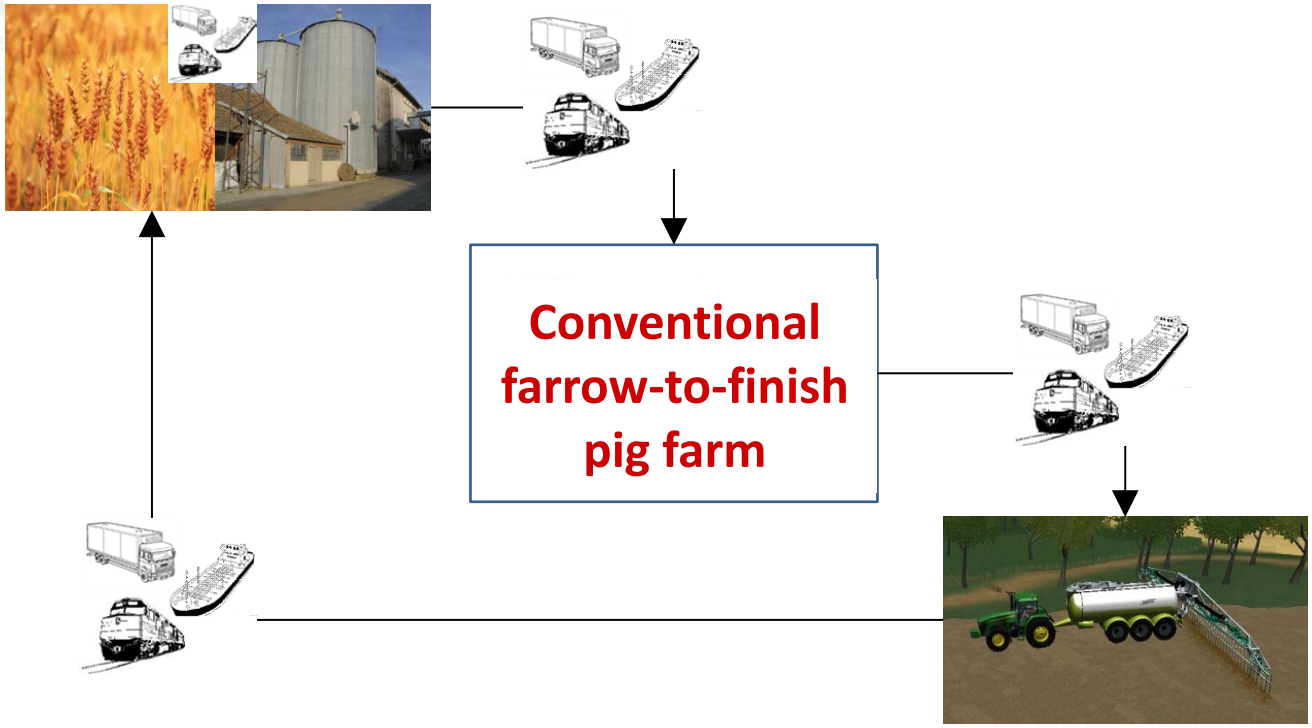
LCA METHODOLOGY

Landless pig unit

1 kg of live pig

Performances from Dourmad et al. (2012)

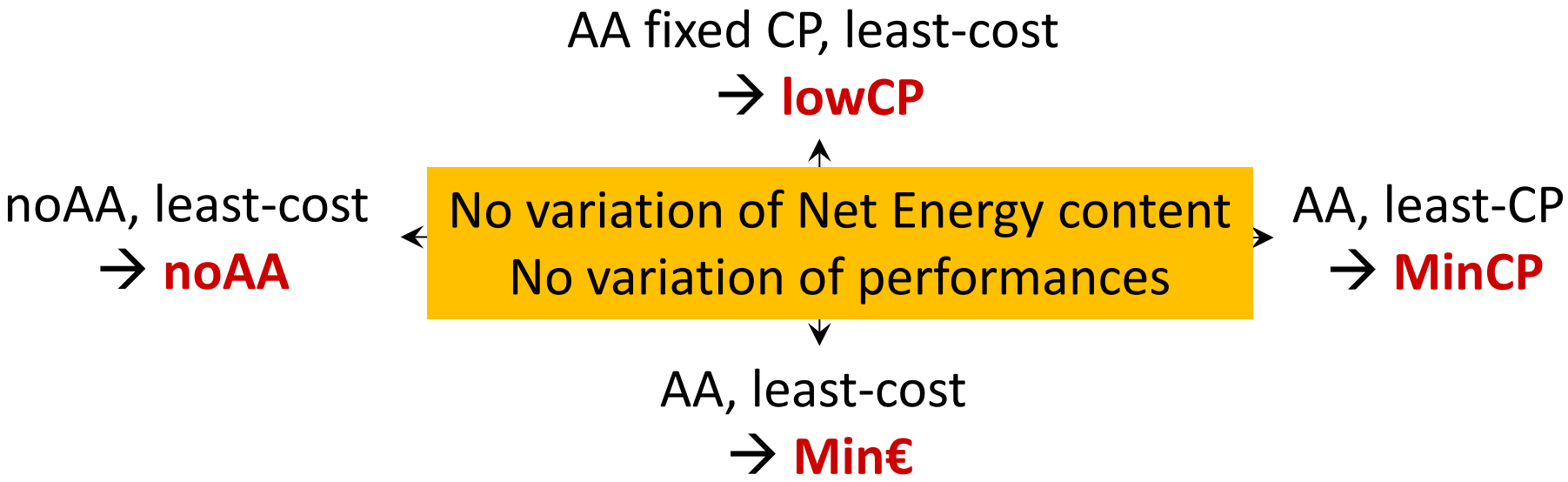
Slurry vs. solid manure



2 protein sources: soybean vs. soybean, rapeseed and pea

Various environmental impacts considered:
Climate change, acidification, eutrophication, energy use, terrestrial ecotoxicity and land use

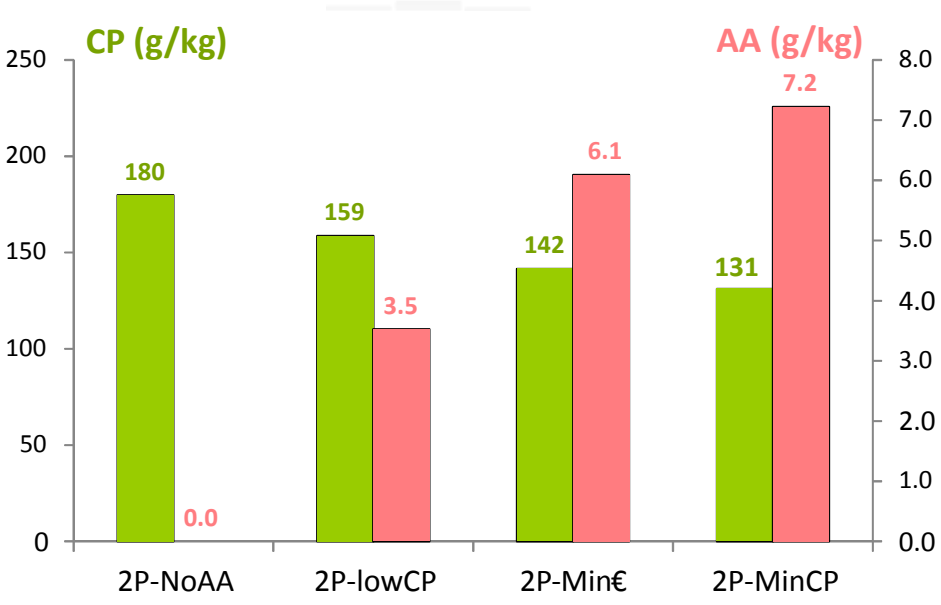
FEEDING SCENARIOS / 5 AA available

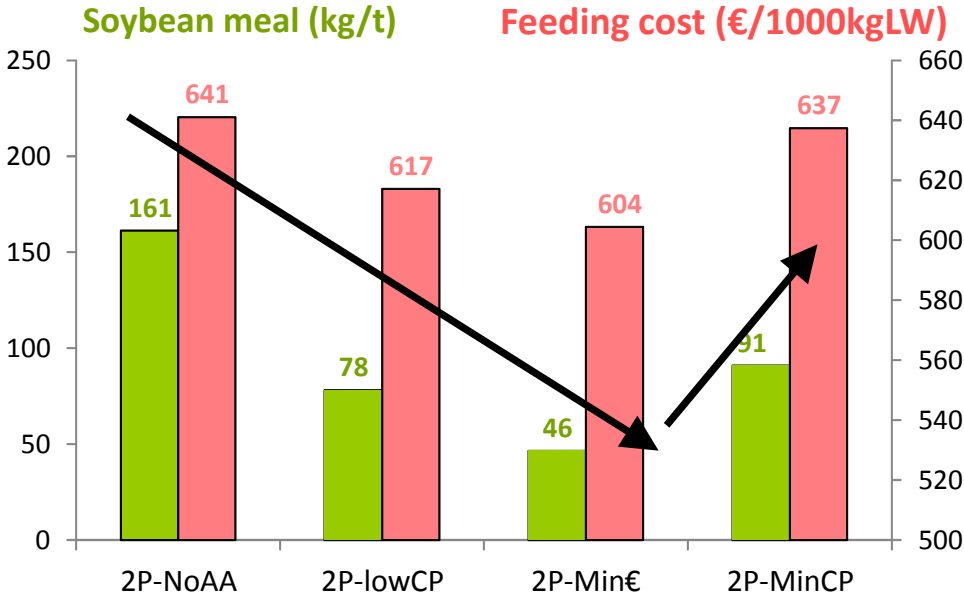


3 Feeding programs :

Single phase (**1P**), Two phases (**2P**), Multiphase feeding (**MP**)

FEEDS COMPOSITION



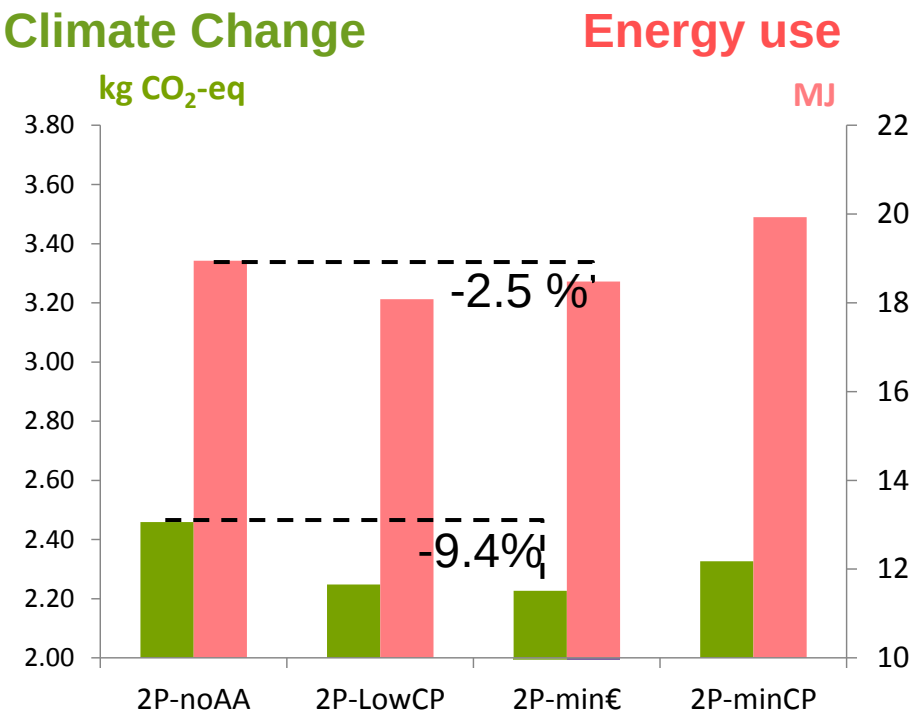


→ Increasing levels of AA incorporation, and decreasing levels of Crude Protein content

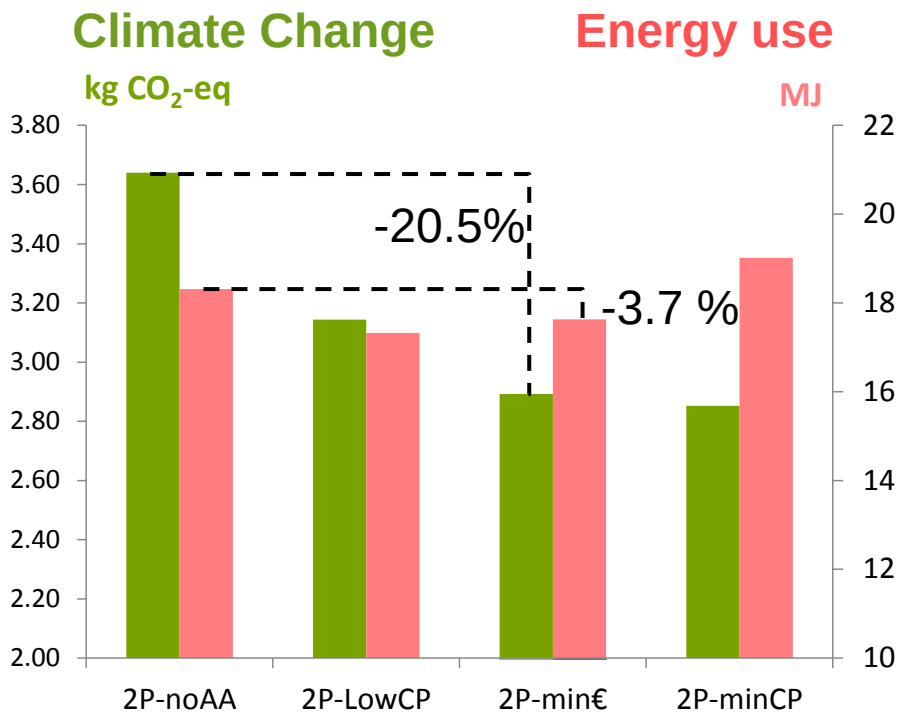
→ lowest cost and soybean meal incorporation in Min€

MITIGATION OF IMPACTS / kg LW (1)

SLURRY



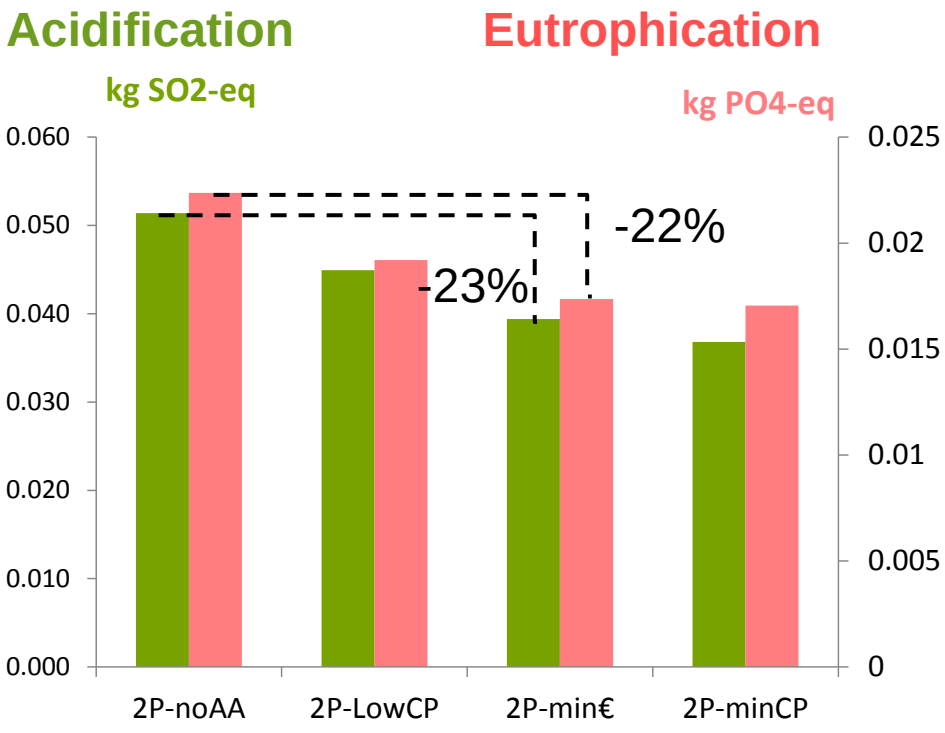
SOLID MANURE



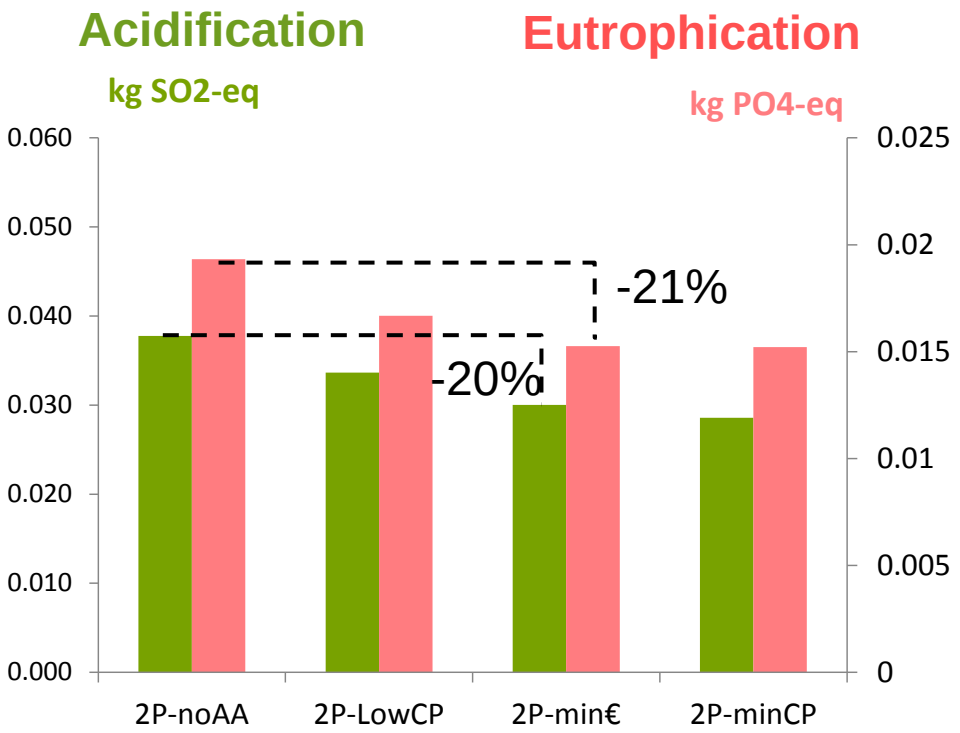
→ Decreasing levels of climate change from noAA to Min€

MITIGATION OF IMPACTS / kg LW (2)

SLURRY

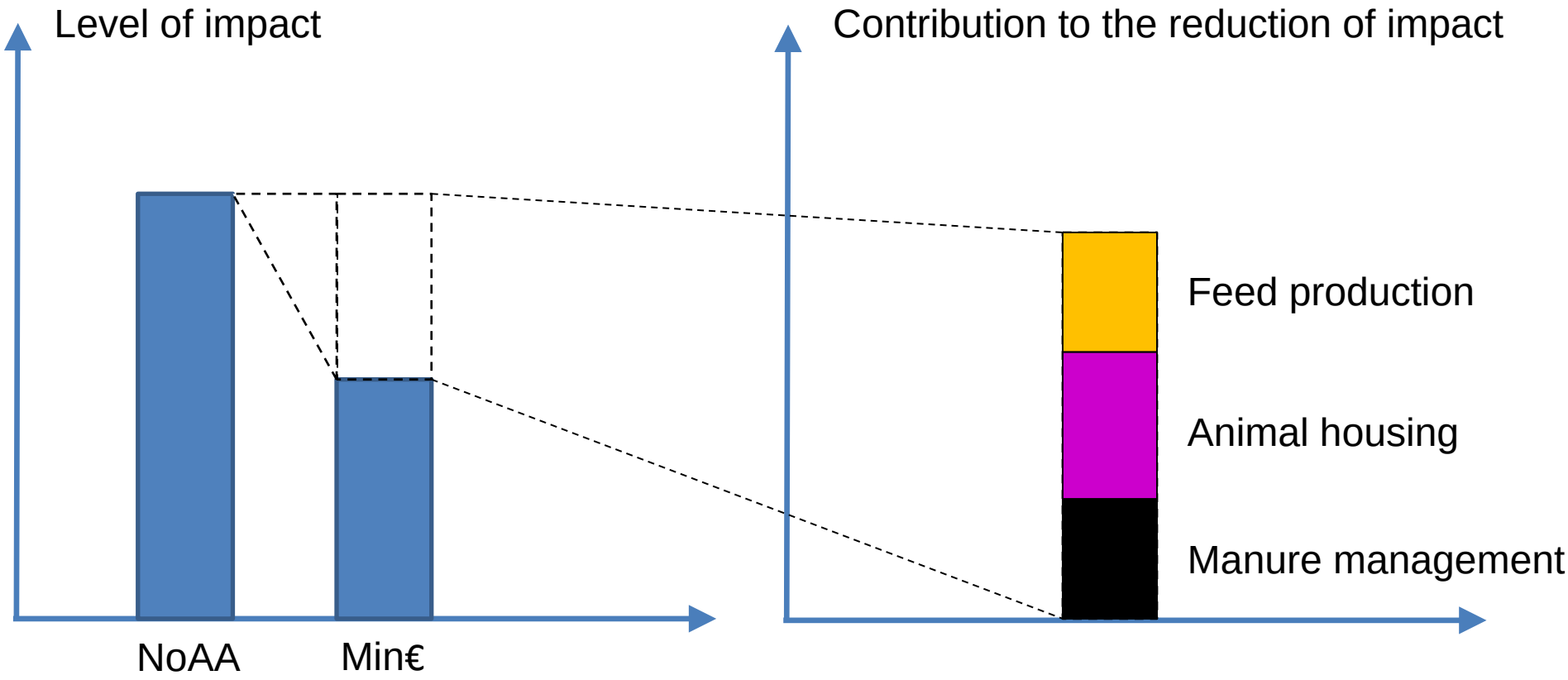


SOLID MANURE

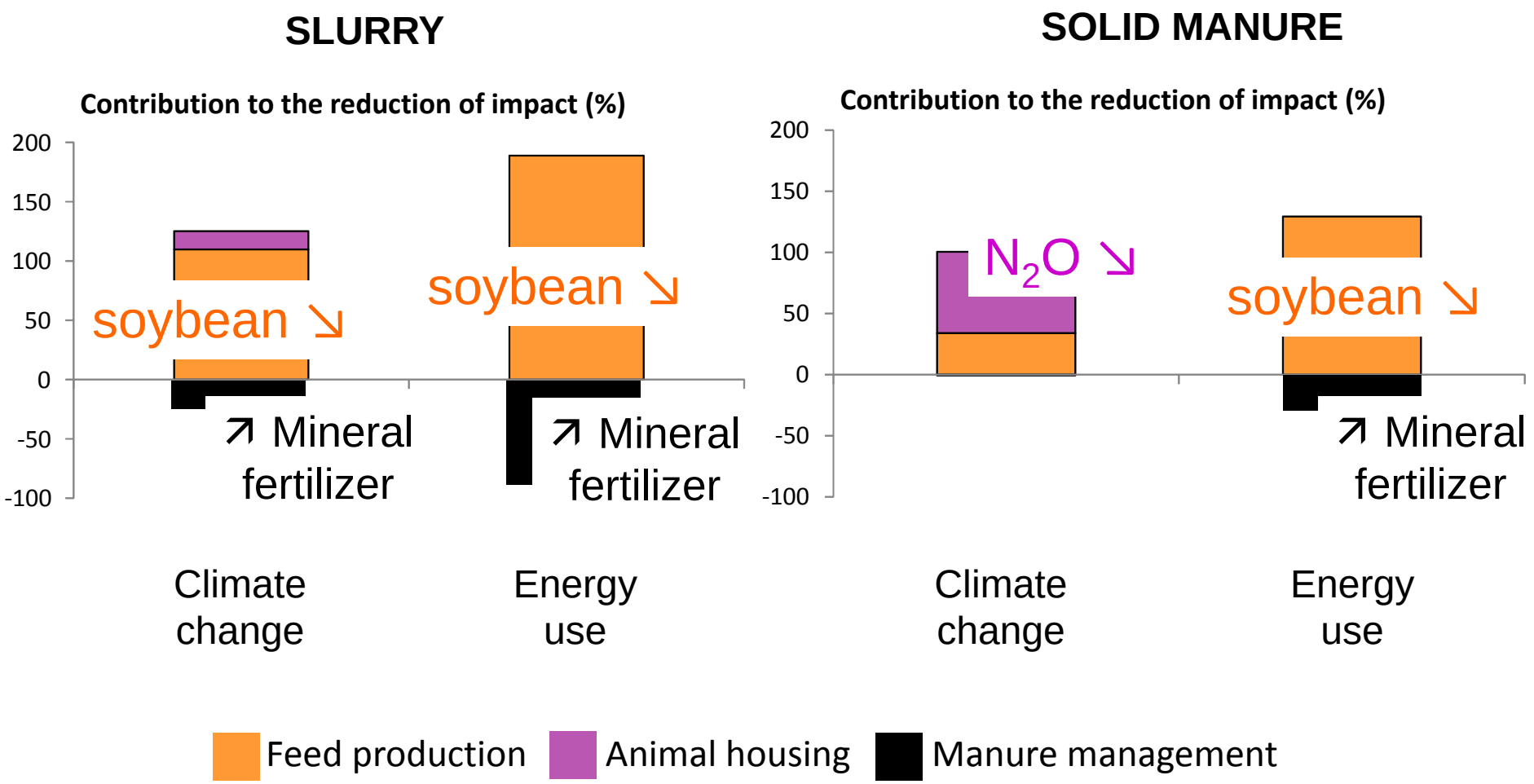


→ Decreasing levels of acidification and eutrophication from noAA to MinCP

MECHANISMS OF MITIGATION



MECHANISMS OF MITIGATION



MECHANISMS OF MITIGATION

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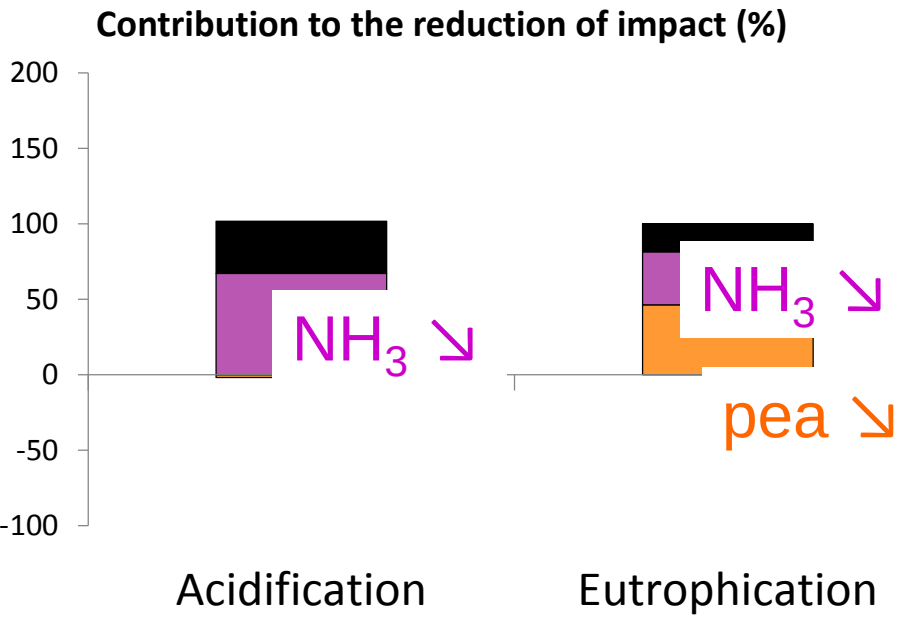
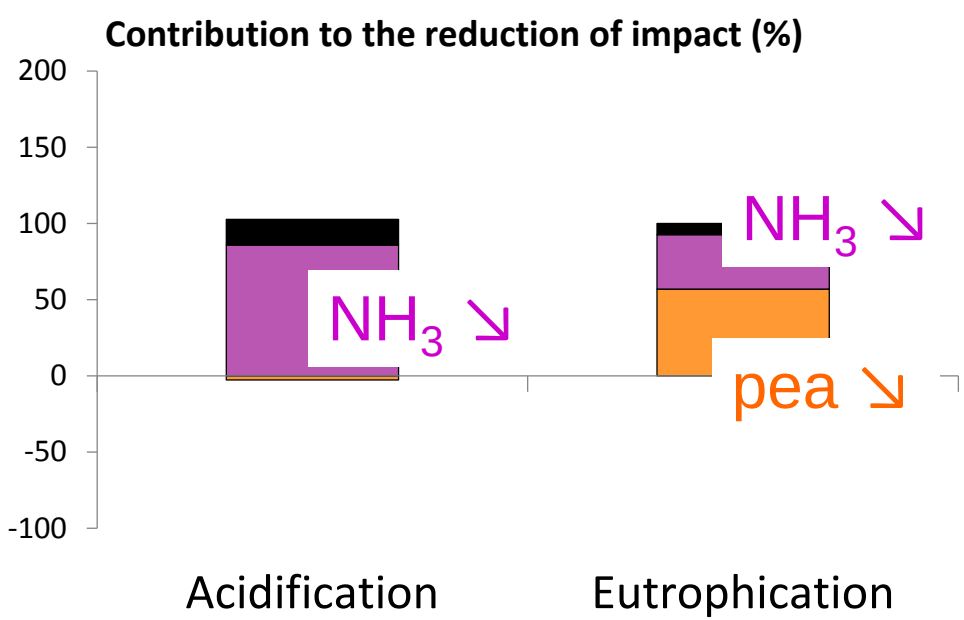


SOLID MANURE



Feed production | Animal housing | Manure management

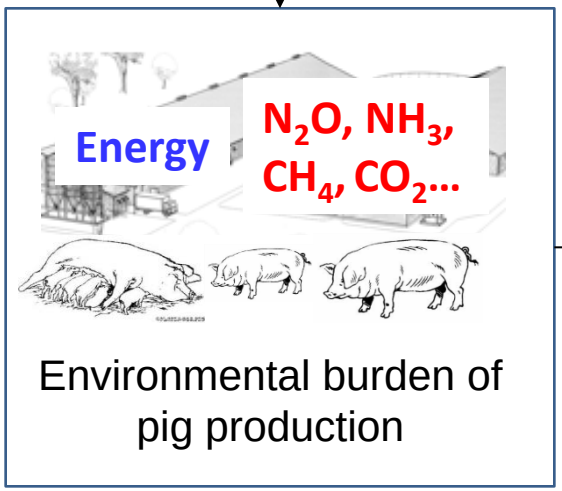
CONCLUSIONS & PERSPECTIVES

- The incorporation of FU amino acids associated with a decrease in crude protein content of diets contributes to reducing the impacts of pig production on climate change, acidification and eutrophication as well as the feeding cost (Min€)
- Mechanisms associated include reduction of soybean incorporation into feeds and reduction of N excretion.
- Substantial reduction of impacts when using FU amino acids / further reduction when associated to multiphase feeding
- Incorporation of feed-use amino acids and multiphase feeding improve feed efficiency in pigs by adjusting the quality and quantity of nutrients dynamically to the requirements

Thank you for your attention…

Feed ingredients
and feed processing

Life Cycle Assessment
→ to evaluate the impacts



Environmental burden of
pig production

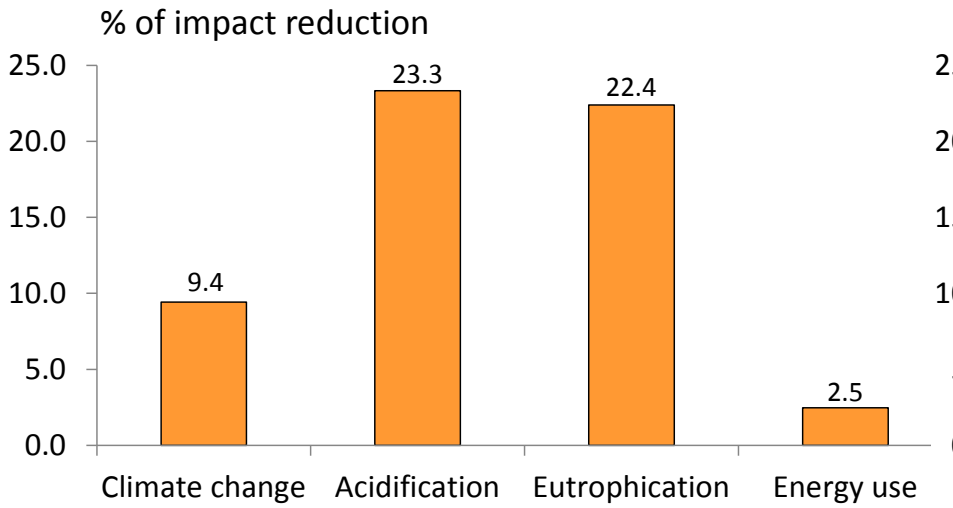
Manure storage
and spreading

Life Cycle Assessment
→ to explore options for mitigation

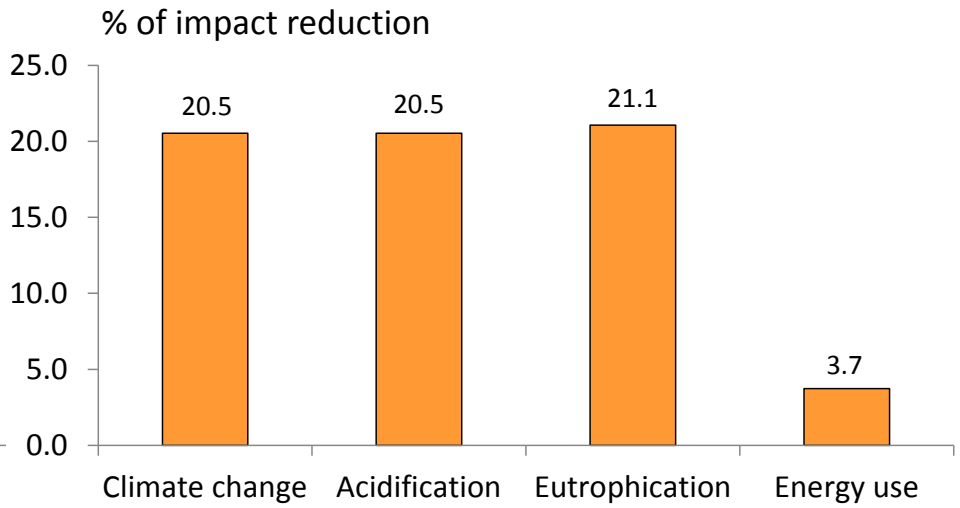
POTENTIAL REDUCTION OF IMPACTS

2P-noAA vs. 2P-Min€

SLURRY



SOLID MANURE



→Climate change and energy use: moderate potential

→Substantial potential for acidification and eutrophication