PIG RESEARCH SUMMIT 2024

SUSTAINABLE PIG FEED FOR THE FUTURE

20 – 21 November 2024 at Crowne Plaza Copenhagen Towers, Denmark

Thursday 21 November

What are the sustainable pig feed protein sources in the future?

Chair: Janni Hales Pedersen, *SEGES Innovation*

Quantification of the benefits of reducing dietary CP level for fattening pigs in terms of global warming potential depending on the origin of amino acids: a meta-analysis

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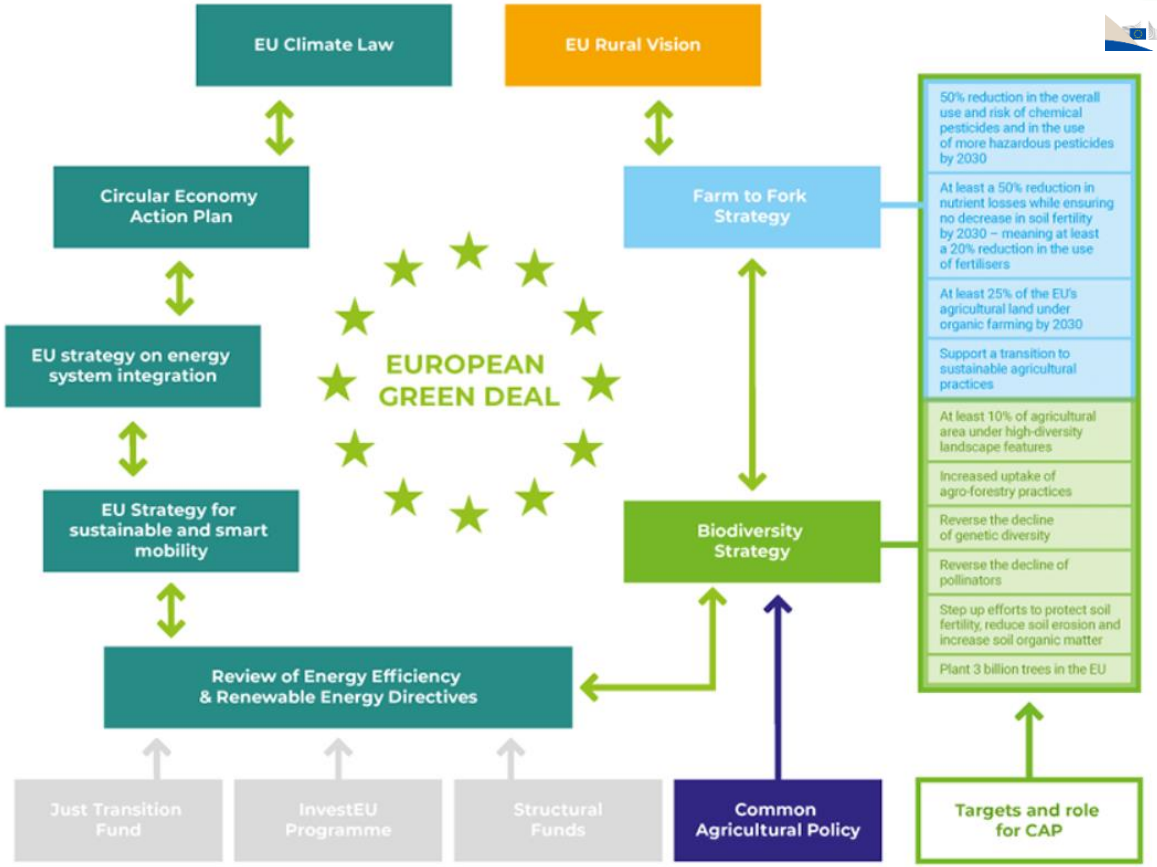
INTRODUCTION

Increasing the EU's Climate Ambition for 2030 & 2050

- The European Green deal announced in 2019
- The EU adopted the European Climate Law on 30 June 2021
- Union-wide climate-neutrality objective for 2050
- New 2030 target of at least 55% net greenhouse gas emissions reduction

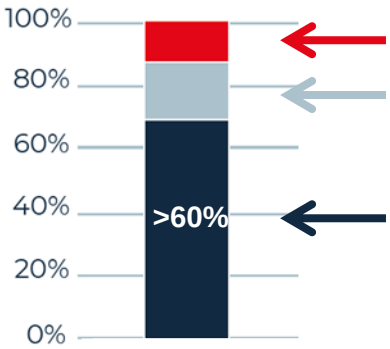
European Green Deal and rural areas



INTRODUCTION - WHAT ARE THE LEVERS OF ACTION?

Spain, Germany, France, Denmark and the Netherlands represent >60 % of the pig production in EU.

Average contribution (%) to the carbon footprint of the conventional pig production



Source : Dourmad et al., 2014

Emissions from manure storage and spreading

Emissions from housing

Feed production and feedstuffs sourcing

Strategies of decarbonisation:

Reducing the N-related emissions
(N excretion and volatilisation, NH_3 and N_2O emissions)

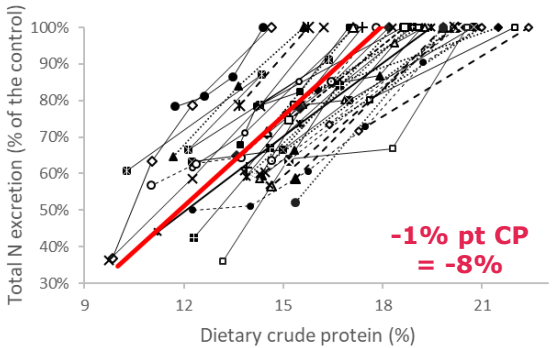
Reducing and replacing the feedstuffs with the largest contribution
(soybean meal, soya oil, …)

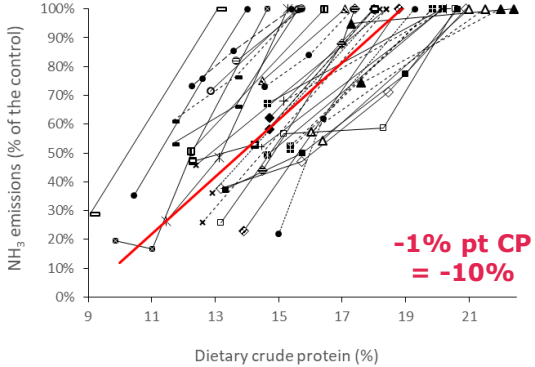
➔ **The feed represents > 60 % of the carbon footprint of the pig production**

➔ **Nutritional strategies are appropriate to reduce the impact of the pig production**

INTRODUCTION - WHAT ARE THE LEVERS OF ACTION?

Fattening pigs (20-120 kg)





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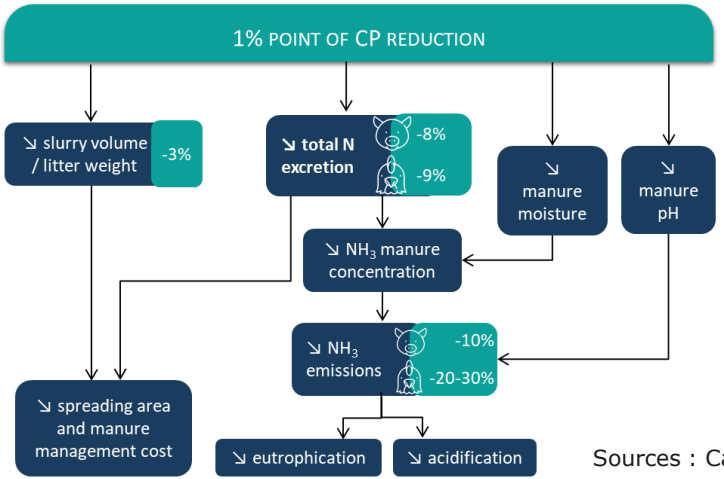

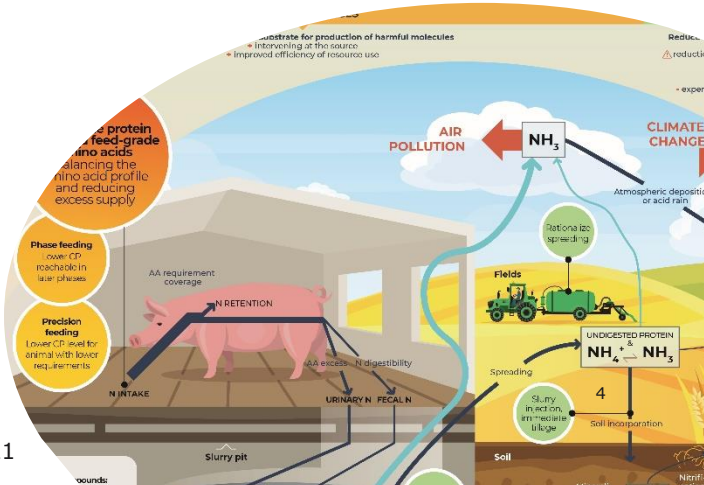

Sources : Cappelaere *et al.*, 2021

INTRODUCTION - OBJECTIVE

Objective of this meta-analysis:

Quantifying the benefits of reducing dietary CP level in terms of global warming potential (GWP) depending on the feed-grade AA origin

Strategies of decarbonisation:

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(N excretion and volatilisation, NH_3 and N_2O emissions)

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(soybean meal, soya oil, …)

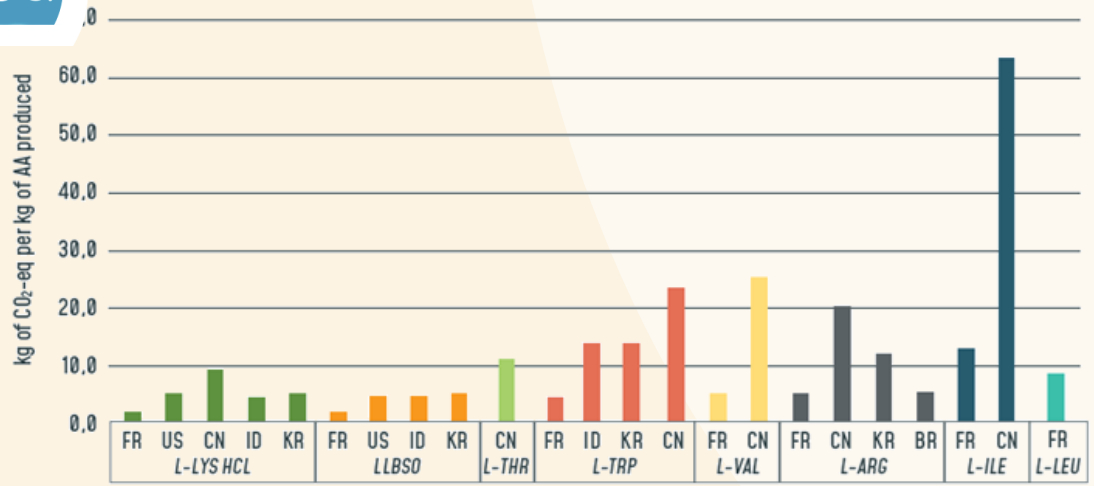
WHY AA ORIGIN MATTERS? LCA STUDY EVEA-EUROLYSINE

The data varies widely from 1.8kg to 62kg CO_2-eq/kg depending on:

1. the AA itself (from Lys, the least impacting to Ile, the most impacting)
2. the country of production (from France, the least impacting to China, the most impacting)

Factors of variation:

1. Between France (FR) and China (CN) ➔ factor of x5
2. Between France (FR) and South Korea (KR), USA (US) or Indonesia (ID) ➔ factor of x3



Carbon footprint of amino acids according to their origin of production (EVEA, 2021)

MATERIAL & METHODS

1

Selection of the trials:
- Tested ≥ 3 dietary CP levels
- Published after 2000
- For fattening pigs between 20 and 125 kg body weight (BW)
- Ingredients composition of the experimental diets

2

Dietary nutritional values recalculated with INRA-AFZ tables (2004)

Standardised ileal digestible lysine (SID Lys) and net energy stable between treatments

All indispensable AA at constant levels or above requirements across treatments

3a

Animal performance assessment:
Zootechnical performance for the total period of the experiments:
- average daily feed intake (ADFI),
- average daily gain (ADG)
- feed conversion rate (FCR)

10 experiments; 17 diets

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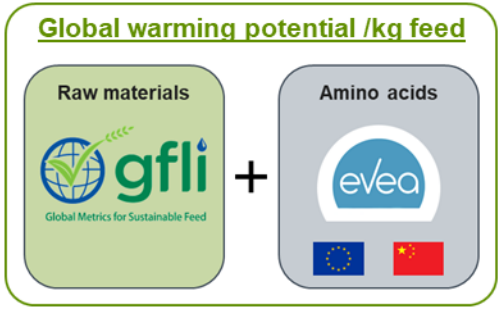
3b

Diets composition and GWP assessment:
The starter, grower and finisher phases were considered independent

Calculation method for GWP:
(Le Cour Grandmaison et al., 2020)



*On-farm emissions are not accounted for in this calculation

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Statistical analysis:
- Dependent variables: ADFI, ADG, FCR, soybean meal inclusion in the diet and GWP per kg of pig BW using 1) AA produced in EU and 2) AA produced in China
- Data were analysed using Minitab (2019) with a general lineal model, including the "Experiment" or "Diet" as fixed factor and "CP level", "AA origin" and their interaction as covariable

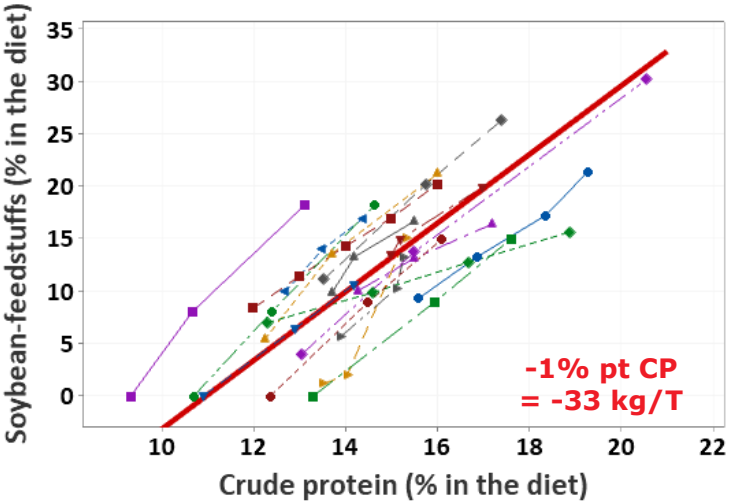
eurolysine

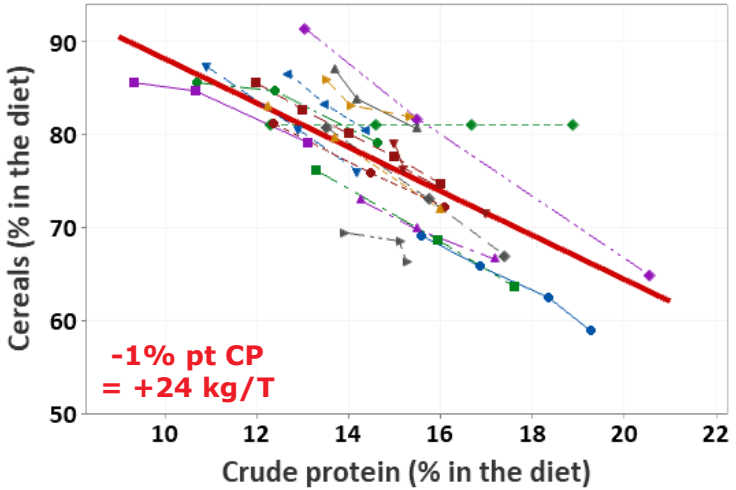
RESULTS

INGREDIENTS COMPOSITION OF THE DIETS:

The meta-analysis quantified that a reduction of 1 %point of dietary CP leads to:

- a reduction of the soybean-feedstuffs inclusion in the diet by 32.8 kg/T ($P < 0.001$)
- an increase of the cereals inclusion by 23.7 kg/T ($P < 0.001$)
- an increase of the feed-grade AA by 2.9 kg/T ($P < 0.001$)





These changes in the diet composition do not affect zootechnical performance of pigs: no effect of the dietary CP level on ADFI ($P = 0.378$), ADG ($P = 0.754$) and FCR ($P = 0.421$)

↳ **Reducing the dietary CP level with a balanced AA profile does not impair pig performance**

RESULTS

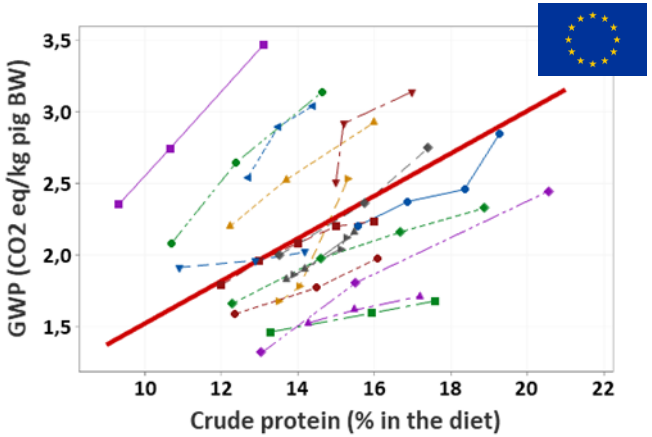
GLOBAL WARMING POTENTIAL:

The average contribution of the feed-grade AA to the GWP per kg of feed was **4.9 ± 0.75%** when using AA from EU and **10.7 ± 1.51%** when using AA from outside EU, illustrating the relevance to take into account their origin.

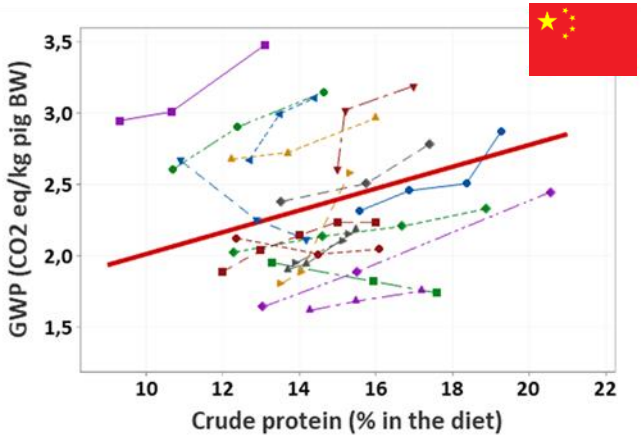
The interaction CP level × AA origin appears to be significant ($P < 0.001$); for each point of CP reduction, the reduction of the GWP is:

- 0.148 kg CO_2-eq per kg of pig BW using AA from EU origin ($P < 0.001$)
- 0.076 kg CO_2-eq per kg of BW using AA from outside EU ($P < 0.001$)

Reducing the CP level in pig diets has a remarkable beneficial effect on climate change when EU sourcing is used for AA



-148 kg eq. CO_2/T pig per % pt of CP reduction



-76 kg eq. CO_2/T pig per % pt of CP reduction

Using AA solutions produced in Europe enables to reduces twice stronger the impact on GWP / kg of BW than using AA from outside EU

CONCLUSIONS

- Thanks to the increase usage of feed-grade AA, it is possible to further reduce the dietary CP level, as well as the inclusion of soybean meal while maintaining pig performance
- Reducing the dietary CP allows to reduce the GWP of pig production
- Using AA from EU allows to reduce twice more the CO_2 emissions compared to Chinese AA

➔ **Reducing the dietary CP with EU AA sourcing is a successful solution to reduce the GWP impact of pig production while maintaining growth performance of fattening pigs**

THANKS FOR YOUR ATTENTION!

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