EAAP 2018

TREASURE

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Environmental impacts of pig production systems relying on European local breeds

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Conventional pig production

Modern highly selected breeds
and crossbreeding


Lower global impacts / kg LW
Higher local impacts / ha of land

n=25

Traditional pig production

Autochthonous pig breeds
and pure breeding


Higher global impacts / kg LW
Lower local impacts / ha of land

n=5

WOS

Gaining knowledge on environmental impacts of pig production using local breeds

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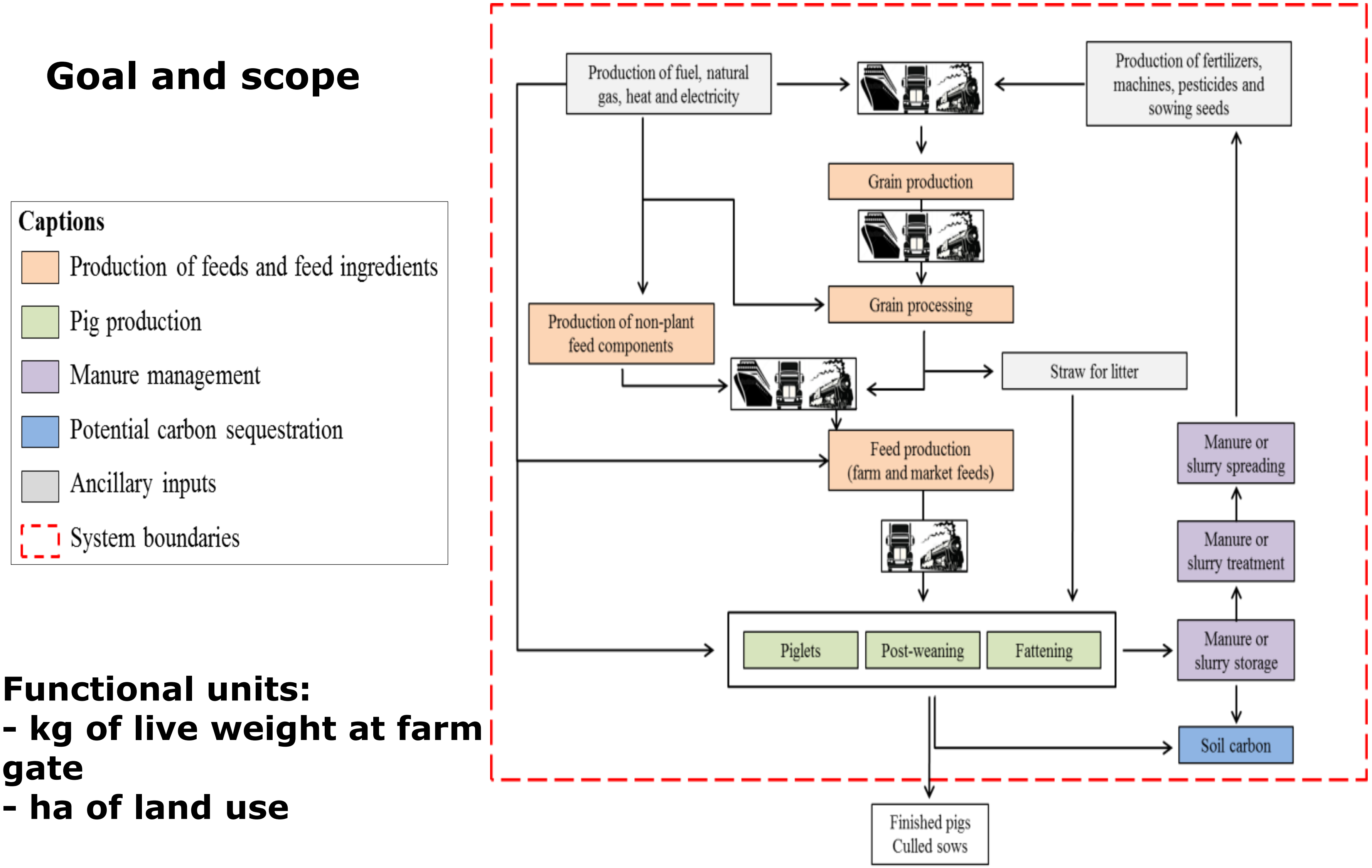
- **What are the hotspots for reduction of environmental impacts?**
- **What are the impacts associated with the use of resources available for outdoor pigs?**
- **What saving of climate change impact could be achieved through carbon sequestration associated with such systems?**

Life Cycle Assessment of pig production in farms raising local breeds in 3 European countries

Goal and scope



Functional units:

- kg of live weight at farm gate

- ha of land use

Inventory of emissions and resources

- On-farm surveys
- Life Cycle Inventories (LCI) of feed ingredients
  - France → EcoAlim dataset (Wilfart et al. 2016)
  - Slovenia and Italy → LCI adapted with yields and fertilization in each country

Country | breed	Farms
France | Gascon	N=25
Slovenia | Krškopolje	N=15
Italy | Mora romagnola	N=8

- Nutrient (mainly N, P and K) excretion = intake – retention
- N Retention (Rigolot et al. 2010) with lean % at slaughter:
  - 35% for Gascon breed (Sans et al., 1996)
  - 44 % for Krškopolje breed (Čandek-Potokar et al., 2003)
  - 39 % for Mora Romagnola breed (Fortina et al., 2005).

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Inventory and Characterization

- Nutrient intake for grazing pigs
  - Growing-finishing pigs → grass intake = f(concentrate supply) with 9 exp.
  - Sows → grass intake = 4.49 g DM/kg LW/day (Rivera Ferre et al., 2001)
  - Nutrients contents of pasture from botanical composition and INRA (2010)

- Emissions from pig production
  - NH_3, N_2O, NO_x, and CH_4 for sows, post-weaning piglets and fattening pigs
  - Outdoor → Emission factors from Basset-Mens et al. (2007)
  - Indoor → Step-by-step procedure recommended by EMEP/EEA (2016)

- CML method for Global warming Potential (GWP), Acidification (AC), Eutrophication (EU), Land Occupation (LO), and Cumulated Energy Demand CED V1.8

Scenarios

- 2 Scenarios of grass digestibility
  - grass with high digestibility (+25% of the mean) -**HighD**
  - grass with low digestibility (-50% of the mean) – **LowD**

- 2 scenarios for potential carbon sequestration of permanent pastures
  - Low potential scenario: **LowP**

    200 kg C/ha/year → 730 kg CO_2/ha/year (Nguyen et al., 2012)
  - High potential scenario: **HighP**

    500 kg C/ha/year → 1,800 kg CO_2/ha/year (Garnett et al., 2017)

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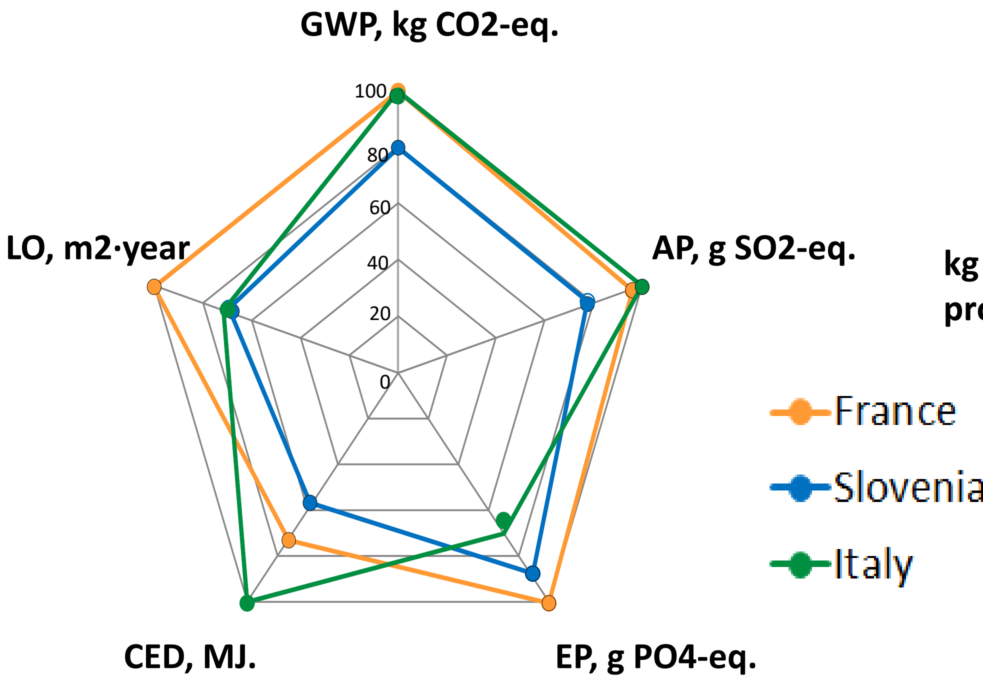
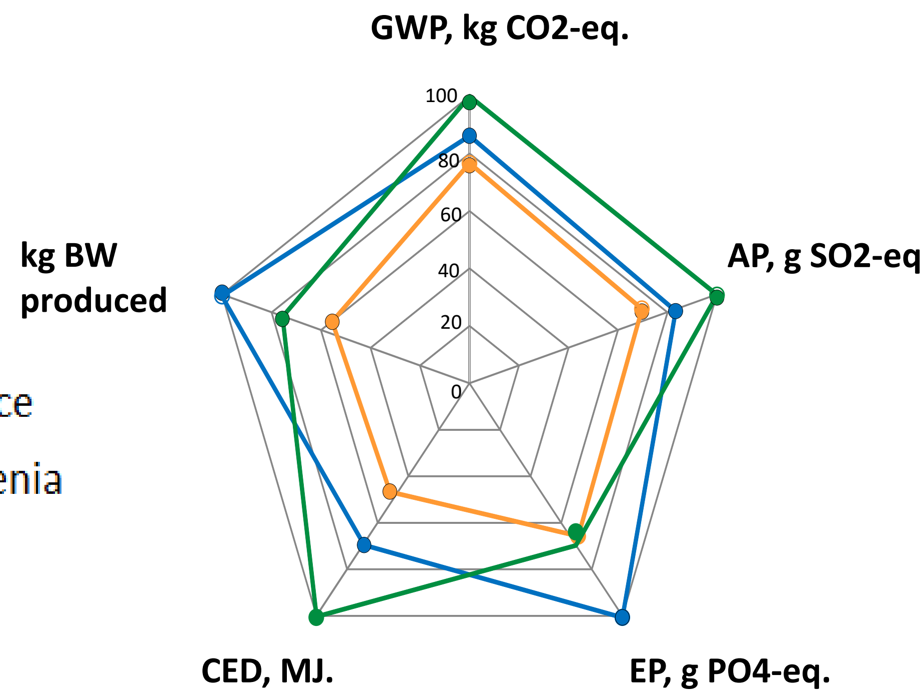
➢ **Impacts per kg LW**



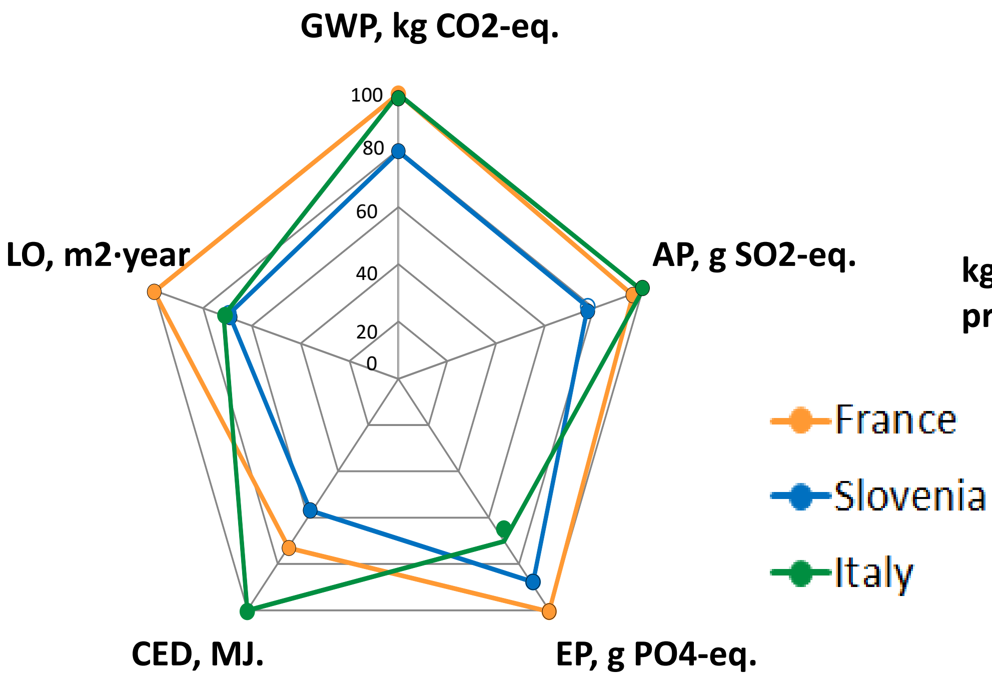
➢ **Impacts per ha of land use**



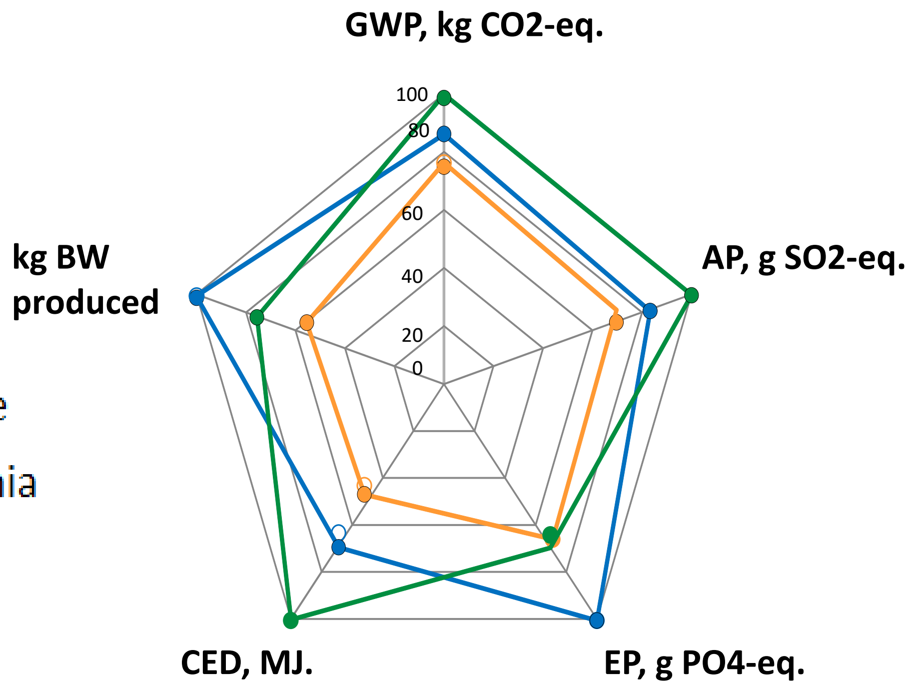
Slovenia:

Lower feed conversion ratio - indoor
Lower GWP of feeds

➢ Impacts per kg LW



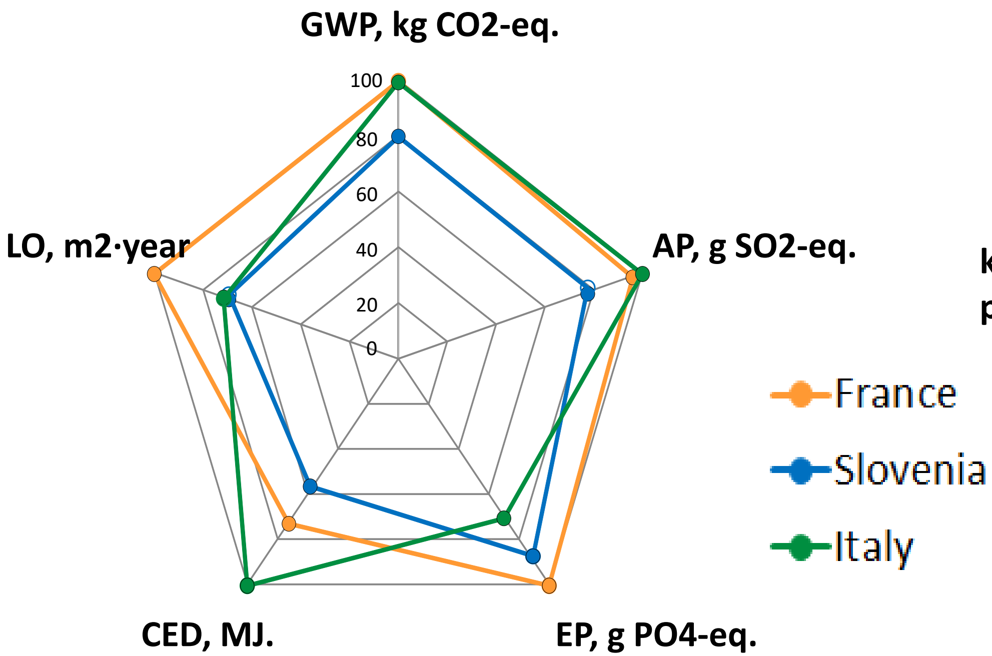
➢ Impacts per ha of land use



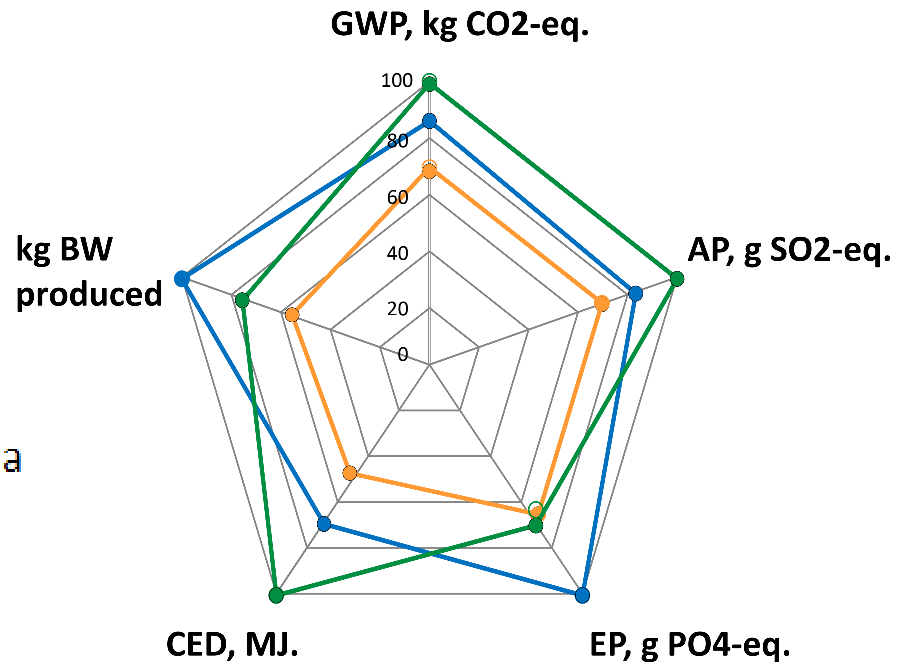
France:

High feed conversion ratio - supply
Outdoor fattening

- **Impacts per kg LW**

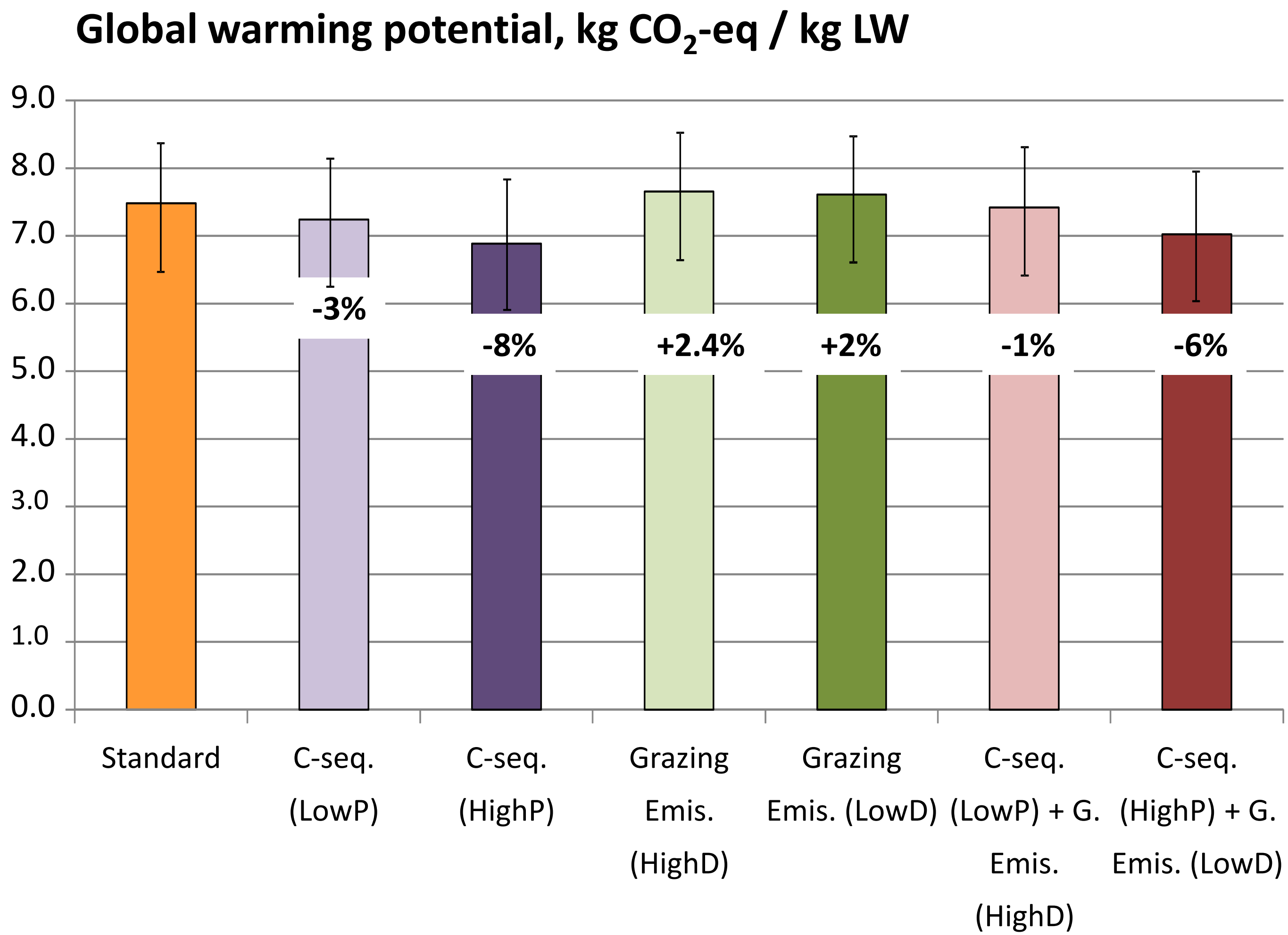


- **Impacts per ha of land use**



Italy:

Higher Crude Protein content of Feeds
Soybean meal → higher CED of feeds



France: C sequestration poorly compensates
Herbage intake low → poor effect of emissions from grazing

Hotspots

1st Animal performance

- Lower feed supply and better FCR
  - Natural resources

2nd Feed composition

- Reduction of dietary CP
  - Nutrients from grass
  - Low potential of protein deposition

3rd Environmental impact of feeds

- Local feed ingredients
  - Transport

C Sequestration and emissions from grazing

1st Low potential of reduction from C sequestration

- high uncertainty

2nd Emissions from intake of natural resources

- uncertainty

3rd Development of emission factor for grazing monogastric animals and better digestibility value of pasture

Thank you for your attention !

Many thanks to the farmers surveyed in the 3 countries and to the companies that shared their data