

Sustainability of zinc supplementation in animal nutrition: case study for HiZox[®]

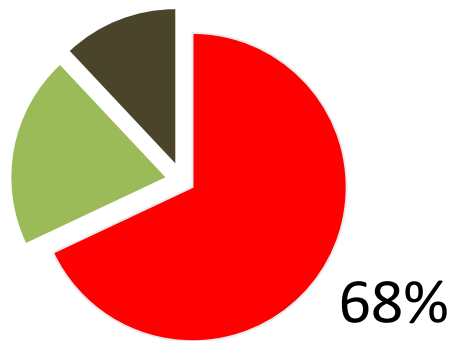
A. Monteiro¹, S. Durosoy¹ and J. Payet²

¹ANIMINE, 335 Chemin du Noyer, Sillingy, France

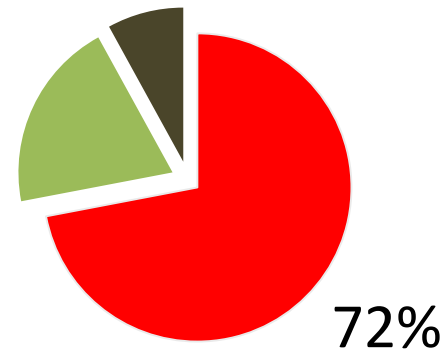
²CYCLECO, 18 Av. Roger Salengro, Ambérieu-en-Bugey, France

Introduction

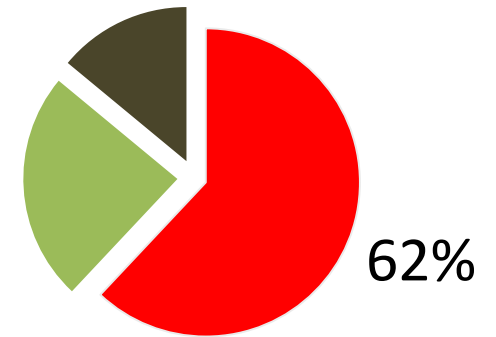
- 21st century: high quality animal protein vs. environmental integrity
- Feed production has a major contribution to most environmental impacts of monogastric farming systems (Dourmad et al., 2014)



Climate change

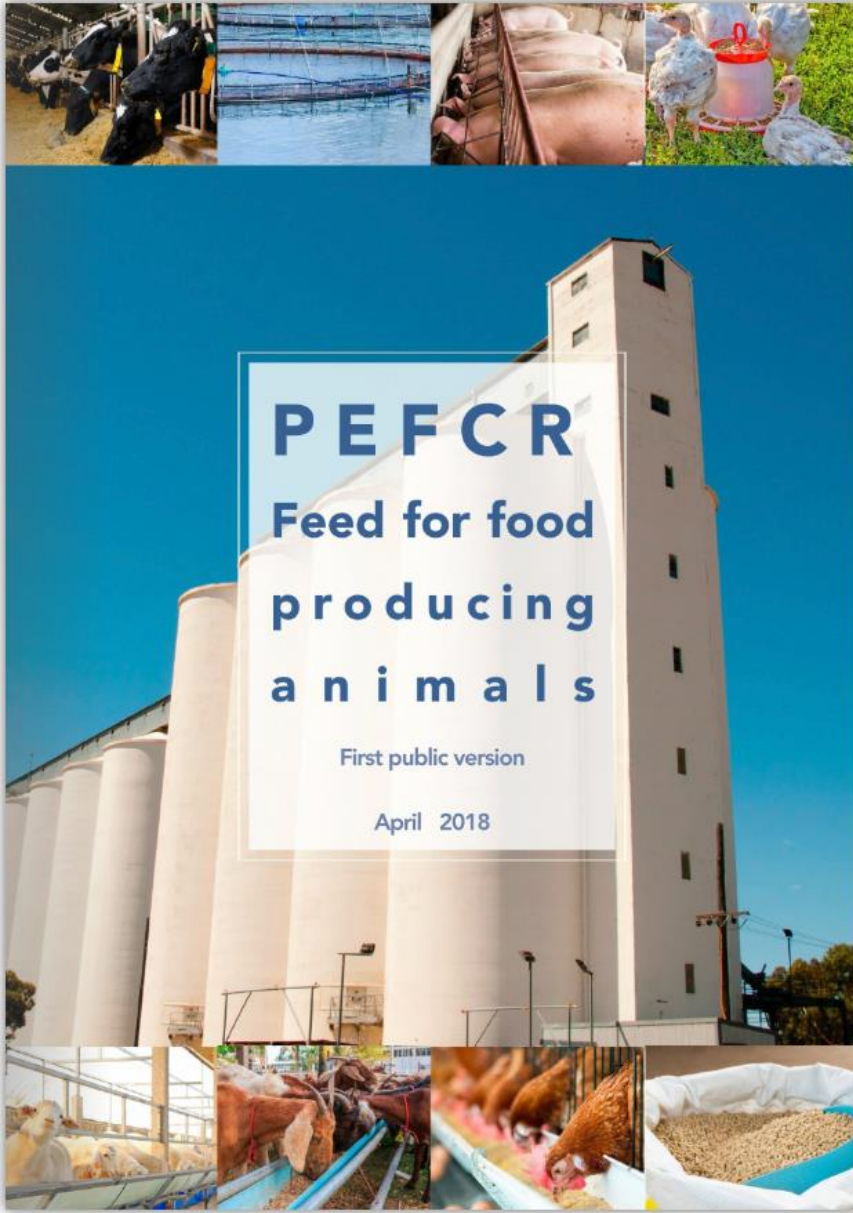


Energy demand



Eutrophication





Introduction

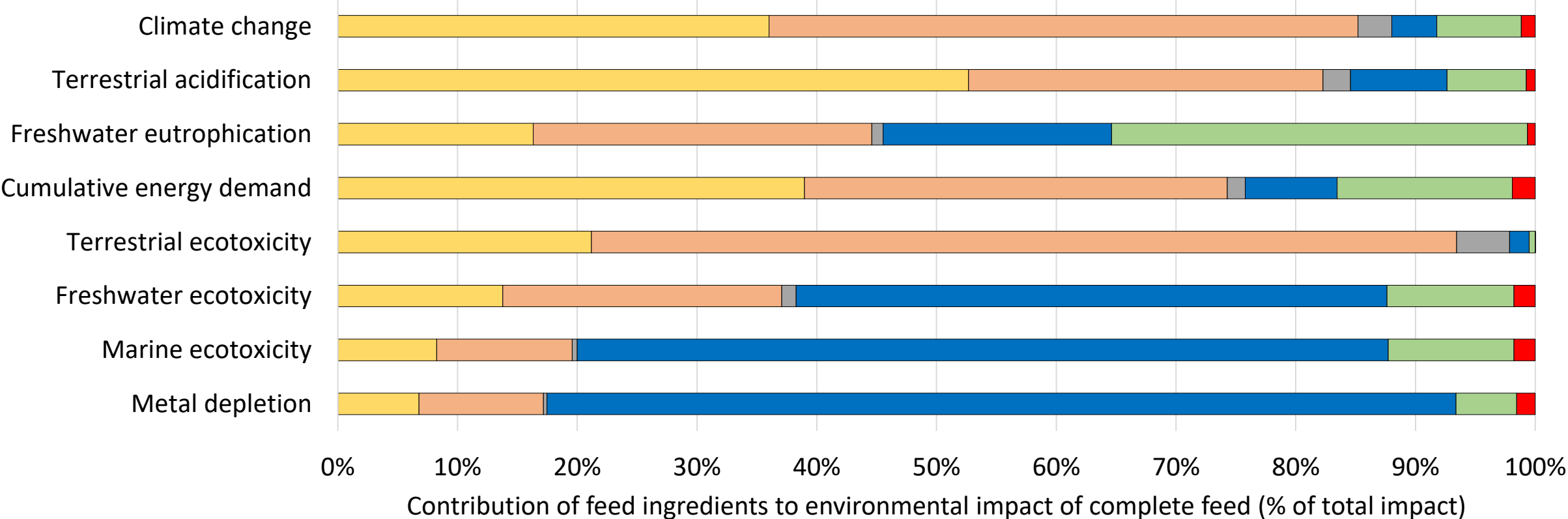
- The European Commission developed a horizontal methodology to measure and communicate the life cycle environmental performance of products in a harmonized way
- However, for feed additives the model of their production process is still being improved
- Feed industry must be committed to contribute to the generation of high quality data on feed additives



Introduction

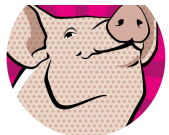
Diet based on the composition of the virtual feed proposed by PEFCR

(average consumption of feed ingredients by the EU compound feed industry)



Monteiro & Dourmad (2018)

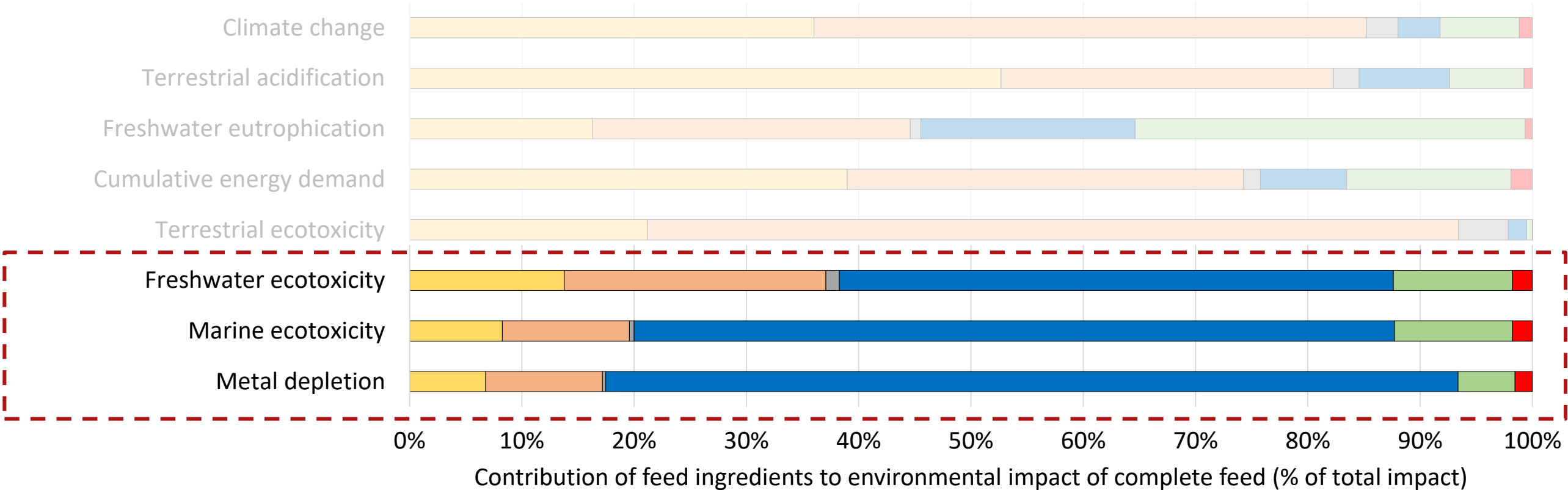
■ Cereals
 ■ Oilseed meals
 ■ Vegetable oils
 ■ Trace minerals
 ■ Amino acids
 ■ Vitamins



Introduction

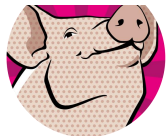
Diet based on the composition of the virtual feed proposed by PEFCR

(average consumption of feed ingredients by the EU compound feed industry)



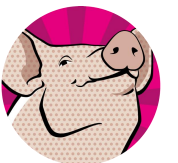
Monteiro & Dourmad (2018)

■ Cereals
 ■ Oilseed meals
 ■ Vegetable oils
 ■ Trace minerals
 ■ Amino acids
 ■ Vitamins



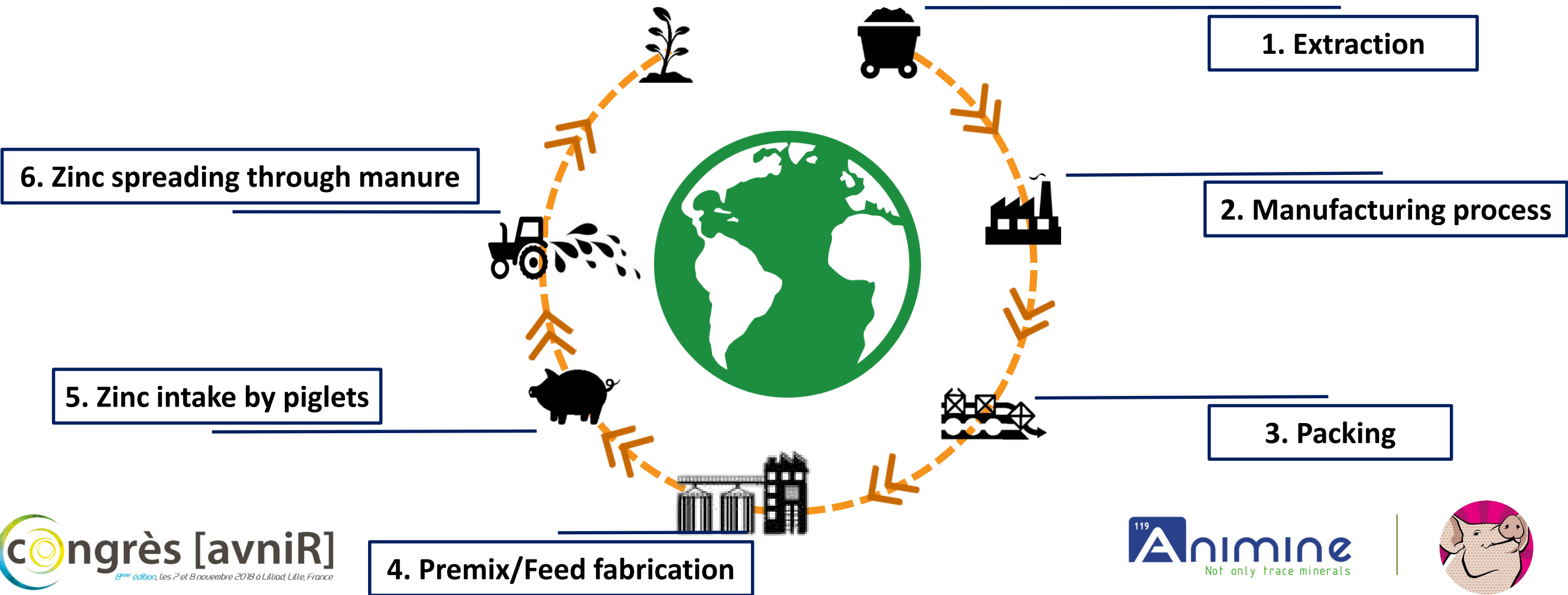
Objective

- To know the environmental burden of Hizox[®] production
- To highlight areas which contribute most significantly to potential environmental impacts
- To identify the hotspots for improvement



Material and Methods

- Functional unit: 1 kg of Zn supplied in piglets diet in Europe



Material and Methods

1. **Extraction:** Ecoinvent v3.1 database

2. **Manufacturing process**

3. **Packing**

4. **Premix/Feed fabrication**

} Surveys performed in the manufacturing factory
(year of reference 2015)

– The transport step was included (1.5 tkm in total)



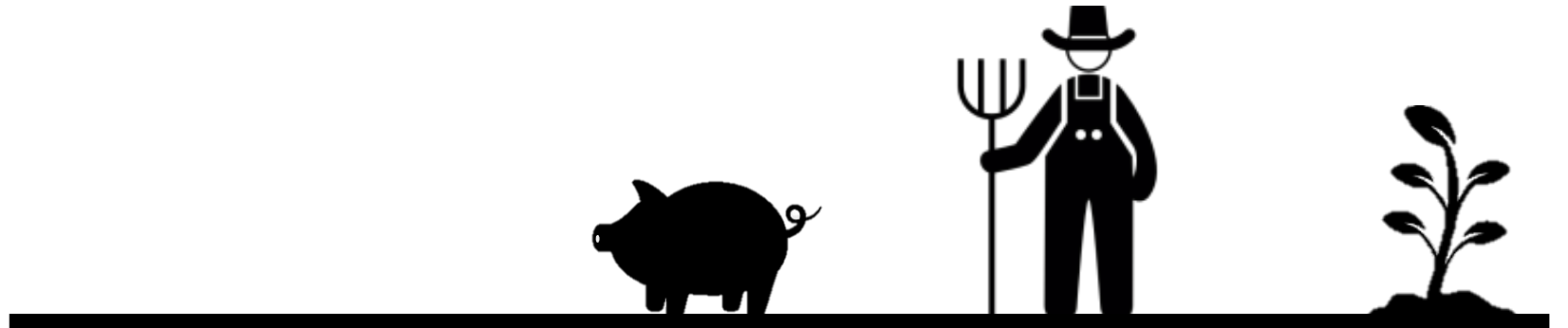
Material and Methods

5. Zinc intake by piglets

- Premix was composed by 6.29% of ZnO

6. Zinc spreading through manure

- 90% of Zn intake was excreted (CORPEN, 2003)



Material and Methods

- **Building process:**



- *HiZox production*
 - *Extraction (1); Manufacturing (2)*
- *Packing (3)*
- *Premix/feed fabrication (4)*

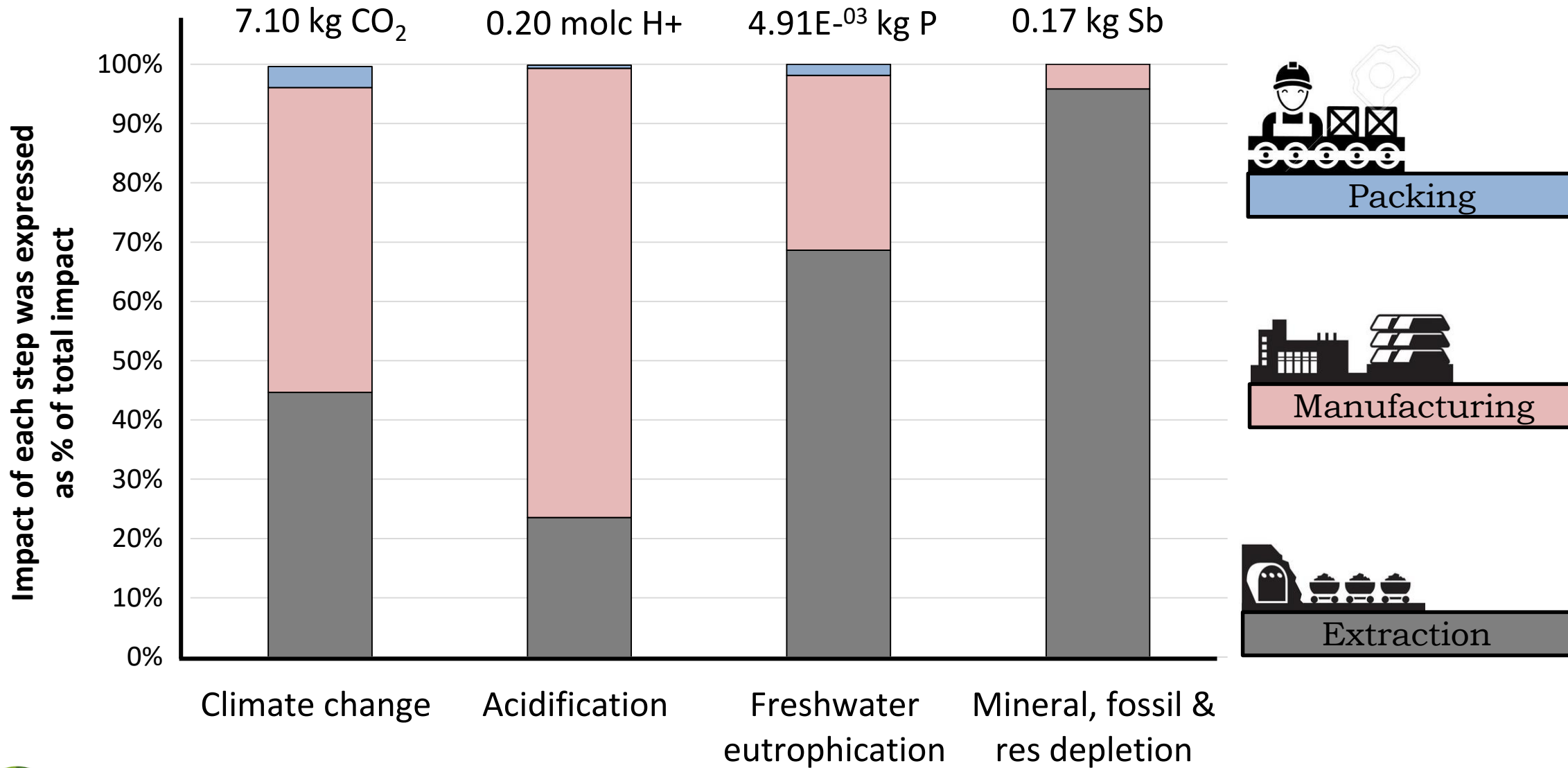
- *Zinc spreading (6)*

- **Method**

- ILCD 2011 Midpoint as implemented in SimaPro software V8.2



Results



Results

Extraction

- Use of special high-grade Zn as raw material
- Primary Zn

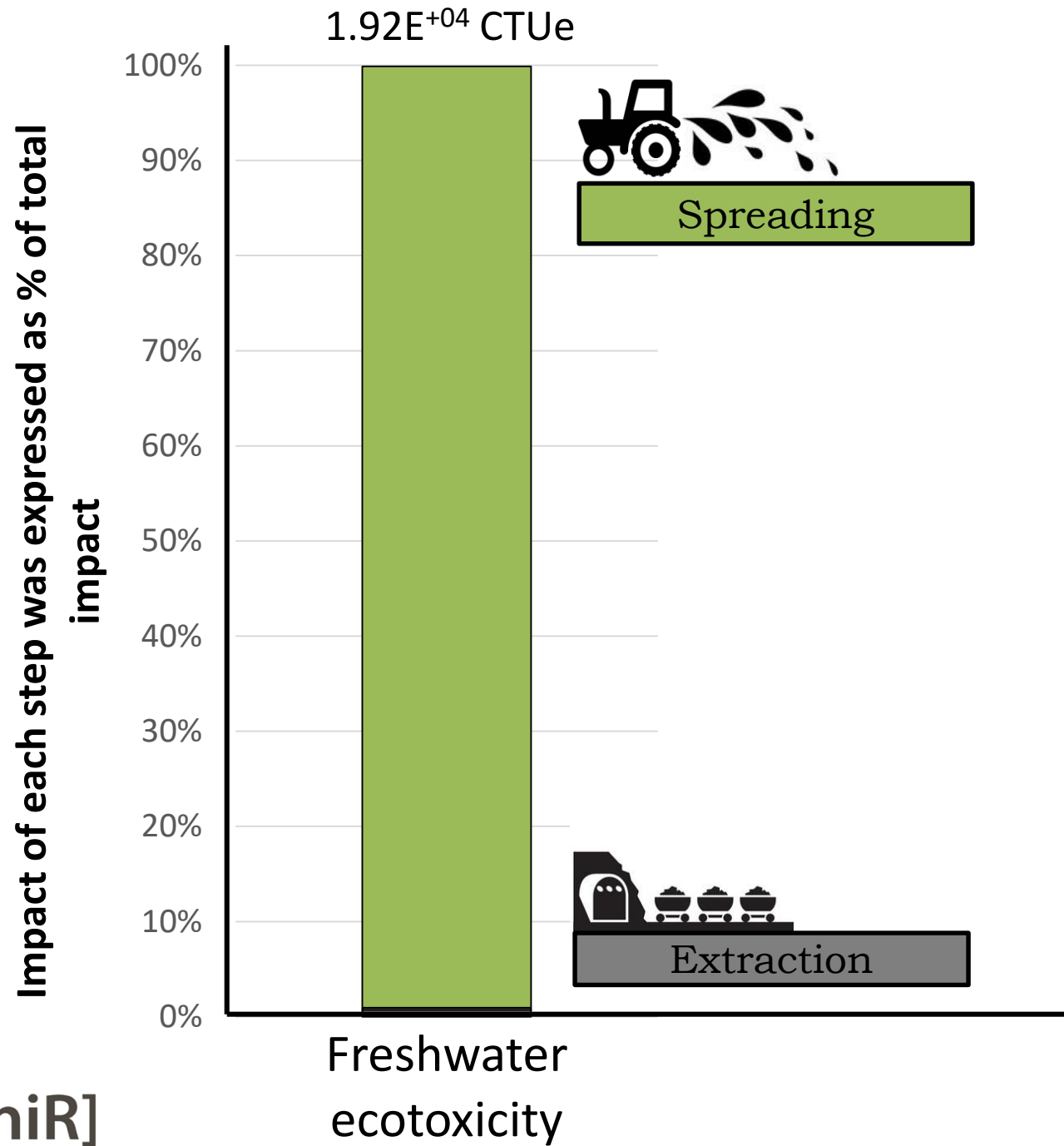


Manufacturing

- Several dissolution and purification steps to obtain the product
- Residue treatment and auxiliary processes



Results



Results

Spreading

- Release of Zn but also heavy metals (As, Cd, Pb)

Contaminants	Other Zn sources EU Directive 2002/32	Zinc oxide	HiZox®
Arsenic	30	100	5
Cadmium	10	30	2
Lead	100	400	20
Dioxins (ng)	1,5	1,5	1,5

Maximum content (mg/kg)



Conclusions

1. Generation of LCA data on feed additives (HiZox[®] case)
2. Extraction and manufacturing contribute the most for LCA of production process
 - a. Room for improvement (?)
3. Perspective
 - Comparative LCA: HiZox vs. other Zn sources
 - Functional unit: amount of Zn bioavailable for animals
 - Accounting for speciation of Zn in animal wastes: impact on ecotoxicity?





Sustainable Usage of trace MINerals in Animal Production Programs

The first holistic approach on copper and zinc
supplementation in diets for pigs, broilers, ruminants
and aquaculture



Nutritional status

Assessment of mineral
status with sensitive
biomarkers



Intestinal health

Evaluation of new
biomarkers for intestinal
health



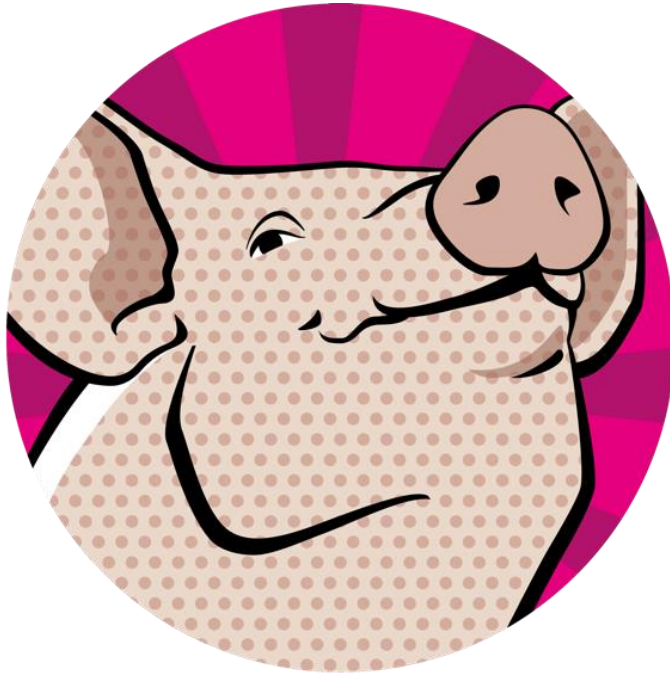
Environmental impact

Ecotoxicity for
Life Cycle Analysis

www.suminapp.eu



This project (E! 11780) has received funding from the Eurostars-2 joint program with co-financing from BPI (in France), CDTI (in Spain) and from the Horizon 2020 Research and Innovation Framework Program of the European Union.



THANKS FOR
YOUR ATTENTION!

amonteiro@animine.eu