

The use of coproducts to mitigate the environmental footprint of pigs and broiler chicken production

Dr Sekhou CISSE, Product R&D manager

*Session 34 - Nutrition management to reduce methane emission and environmental impact
- Part 1*

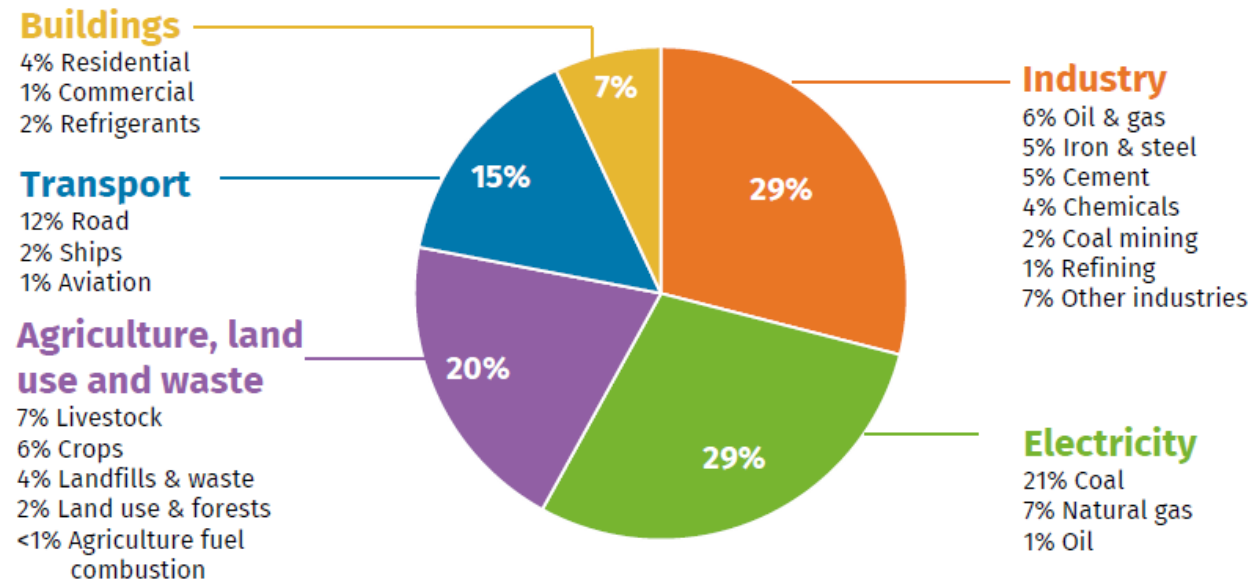


#YOUKNOWWHY

Livestock production sector

Livestock production sector in terms of environmental figures:

Global greenhouse gas emission by sector (2022)



Source: Rhodium Group



Account for $\approx$ 70% of the freshwater used worldwide



Account for $\approx$ 30% of ice-free surface land used in the world



Predictive rapid growth of Livestock production to meet the world population needs



more environmental issues in the future

Introduction

Material & methods

Results

Conclusions

Take Home Messages

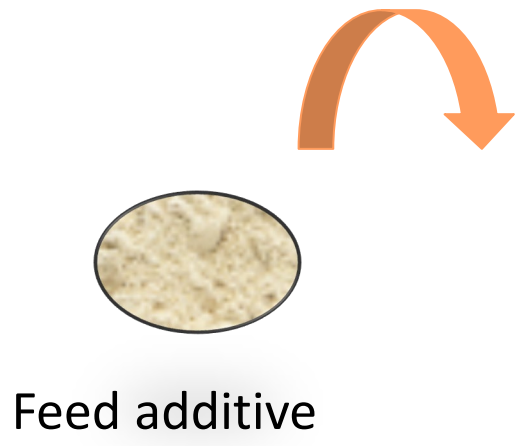
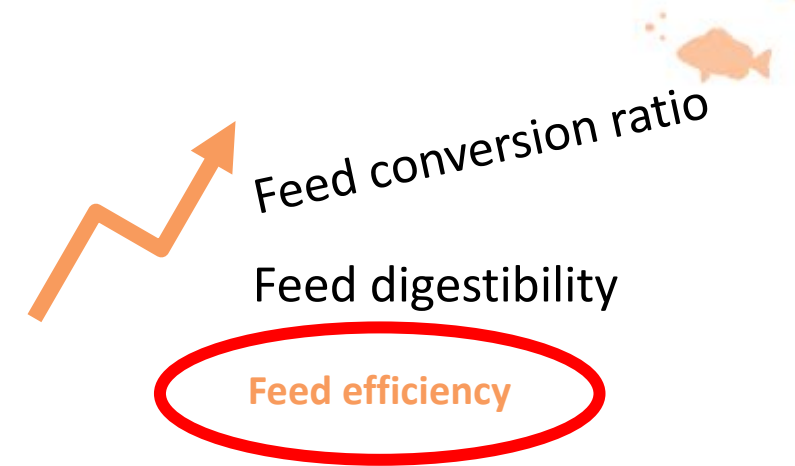
How to reduce livestock production's environmental impact ?



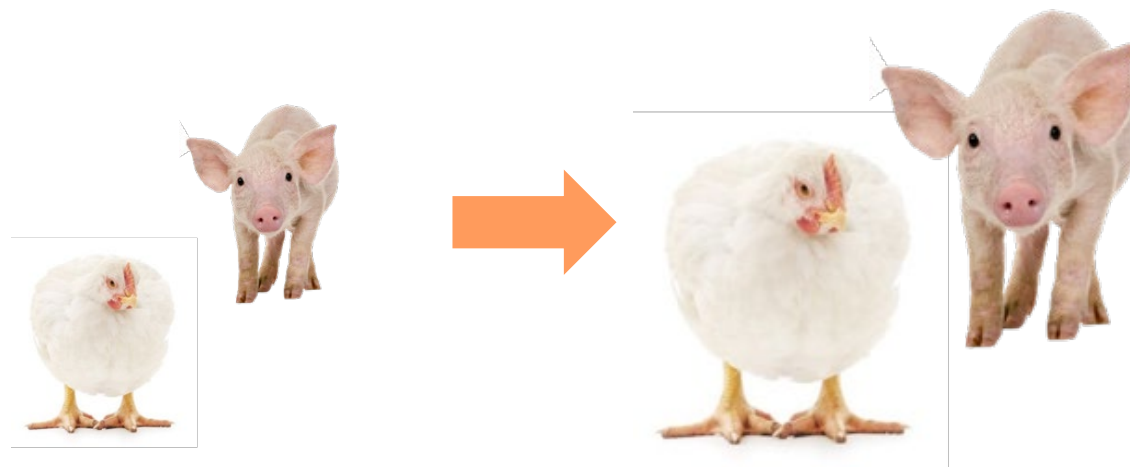
Genetic



Precision Nutrition



Feed additive



Growth performances +++



Feed inputs

Environmental impact

Introduction

Material & methods

Results

Conclusions

Take Home Messages

CEFA as potential solution



Citrus
fruits

Selection/ brushing / cleaning

Juice and oil extraction

Peels

Screw press

Lemon extract

Filtration/ enzymatic treatment/ depectination

Pasteurisation / concentration

Conservative addition

Citrus Extract Feed Additive (CEFA)

Aim of this study: Evaluate the environmental footprint of manufacturing and using a commercially available citrus extract (CEFA, Nor-Spice AB®, Nor-Feed SAS) in pigs and poultry farms.

Introduction

Material & methods

Results

Conclusions

Take Home Messages

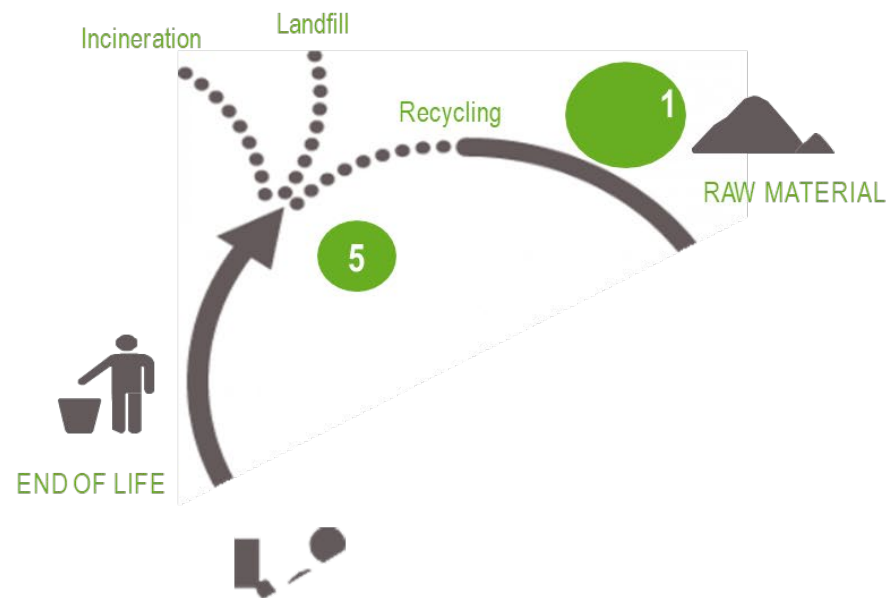
Life Cycle Assessment (LCA)

Definition:

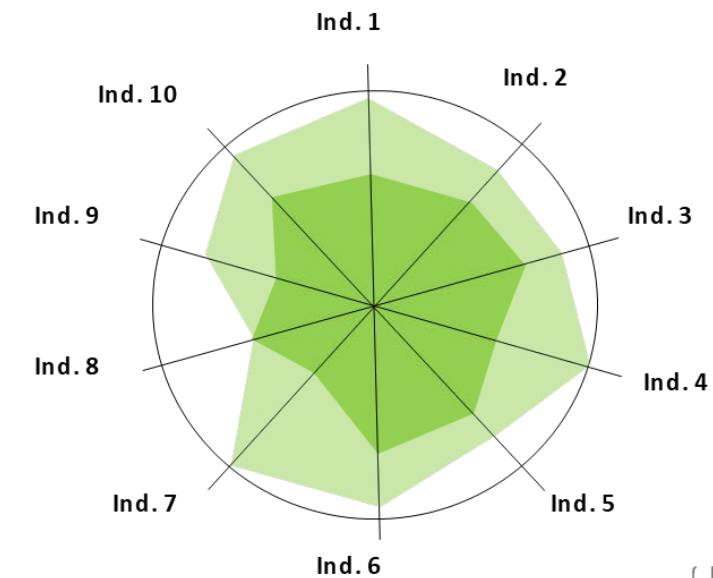
LCA is a method to assess the environmental impacts of a product or a service by quantifying the resources used and the emissions to the environment at several stages of its life cycle. The method is framed by ISO 14040 and ISO 14044 standards.

The two main principles of LCA are:

Life cycle analysis throughout all the life cycle...



...using a multi-criteria approach.



evea
fabrique de solutions durables

Introduction

Material & methods

Results

Conclusions

Take Home Messages

Life Cycle Assessment (LCA)

LCA comprises four phases: Goal and scope definition, Inventory analysis, Impact assessment, and Results/ Interpretation.

1. Goal and scope: System and functional units definition



System 1 represents the production and distribution of CEFA to the end customer.



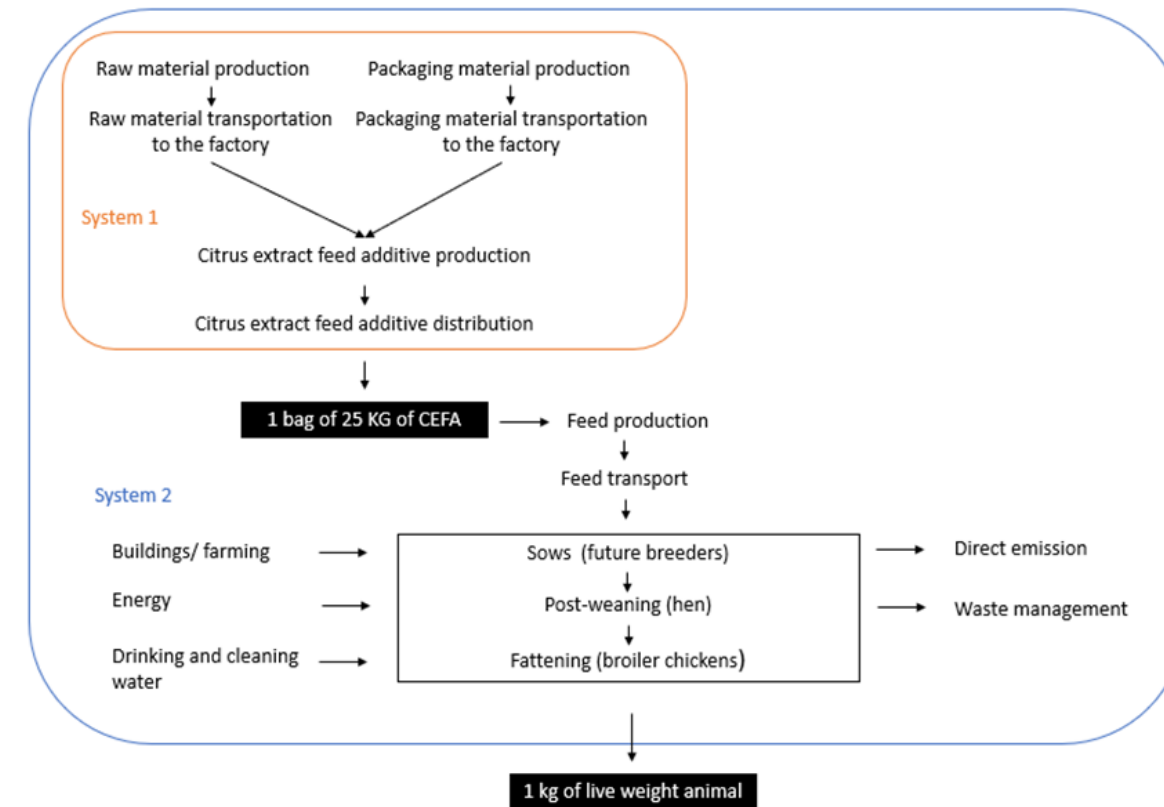
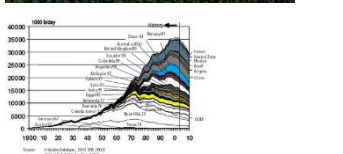
Functional unit 1 : produce and distribute one bag of 25 kg of CEFA.



System 2 represents the use of CEFA on farm.



Functional unit 2: produce 1kg of animal (live weight) fed with (vs. without) CEFA.



Introduction

Material & methods

Results

Conclusions

Take Home Messages

2. Inventory analysis: identification of the data used for the study



Functional unit 1 : produce and distribute one bag of 25 kg of CEFA.

Step	Specific data from the factory	Generic data from database (Agribalyse and Ecoinvent)
CEFA ingredients production and transport	Quantity of each ingredient in the formula of the product Origin of each ingredient Type of production of each ingredient	Ingredients production data Ingredients transport data
CEFA packaging production and transport	Quantity of each material of the packaging Origin of each material	Packaging materials production data Packaging materials transport data
CEFA production	Electricity use in the factory Water use in the factory Losses at the factory (and type of management: spreading) Packaging waste produced by the factory Wastewater produced by the factory	Electricity production data Water production data Waste management data Wastewater management data
CEFA distribution	Distances for distribution	Transport data

Introduction

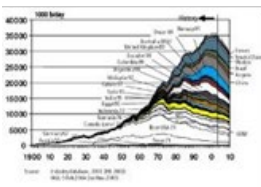
Material & methods

Results

Conclusions

Take Home Messages

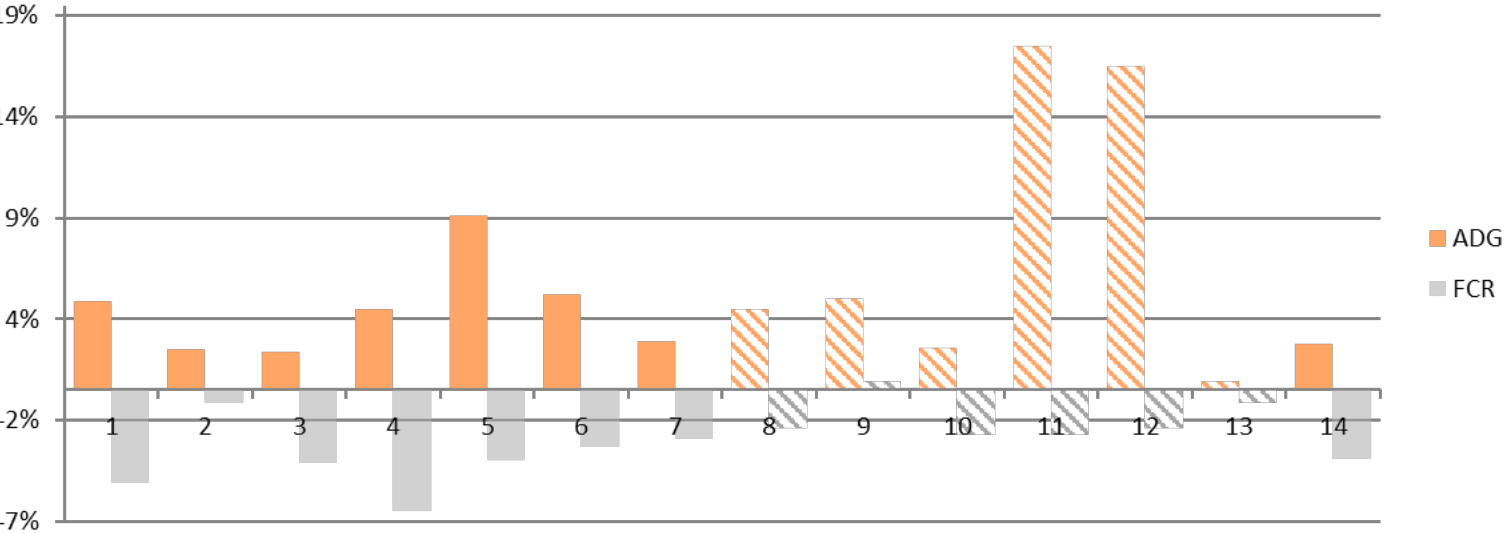
2. Inventory analysis: identification of the data used for the study



Functional unit 2: produce 1kg of animal (live weight) fed with (vs. without) CEFA.

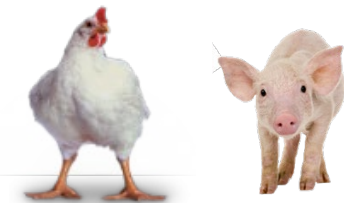
Step	Specific data from the factory	Generic data from database (Agribalyse and Ecoinvent)
CEFA use (functional unit 2)	Benefits of animal production fed with CEFA (performances improvement, ATB replacement...)	Animal production data (chicken and pig)

Metanalysis : CEFA Vs Control group



Average results compared to controls

+ 5.3 % ADG ($p < 0,01$)
- 2.5% FCR ($p < 0,02$)



Introduction

Material & methods

Results

Conclusions

Take Home Messages



3. Life cycle impact assessment (Using the Environmental Footprint method):

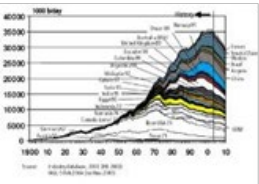


The method combines several impact categories, allowing the identification of potential pollution transfer between impact categories.

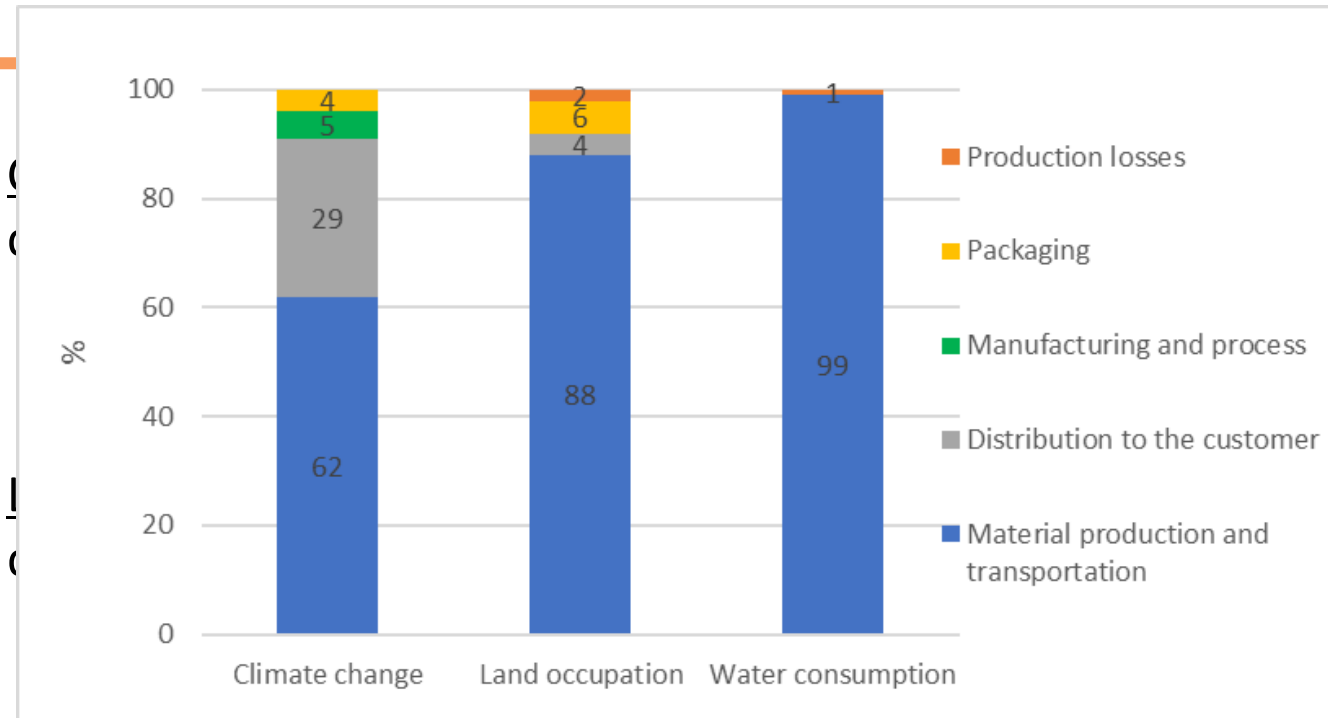
Impact indicator	Units	Robustness
Climat change	kg CO ₂ eq	I
Fines Particles	disease incidence	I
Terrestrial and aquatic acidification	mol H+ e	II
Eutrophisation terrestre	mol N eq	II
Terrestrial eutrophication	kg P eq	II
Eutrophication of marine waters	kg N eq	II
Ecotoxicity of fresh water	CTUe	III
Land occupation	Pt	III
Water consumption	m ³ eq	III

The indicators are chosen based on their robustness (I = “satisfactory” to III = “to be used with caution”) and their ability to translate all the issues of the products studied.

Impact Categories	Unit
Climate change	kg CO ₂ eq
Land occupation	Pt
Water deprivation	m3 eq



Functional unit 1 : produce and distribute one bag of 25 kg of CEFA.



the production and

or the production and

Water consumption: **66 L of water** is consumed for producing one 25 kg bag

Most of these impact are emitted during the stage of CEFA ingredient production and transportation to the plant.

Introduction

Material & methods

Results

Conclusions

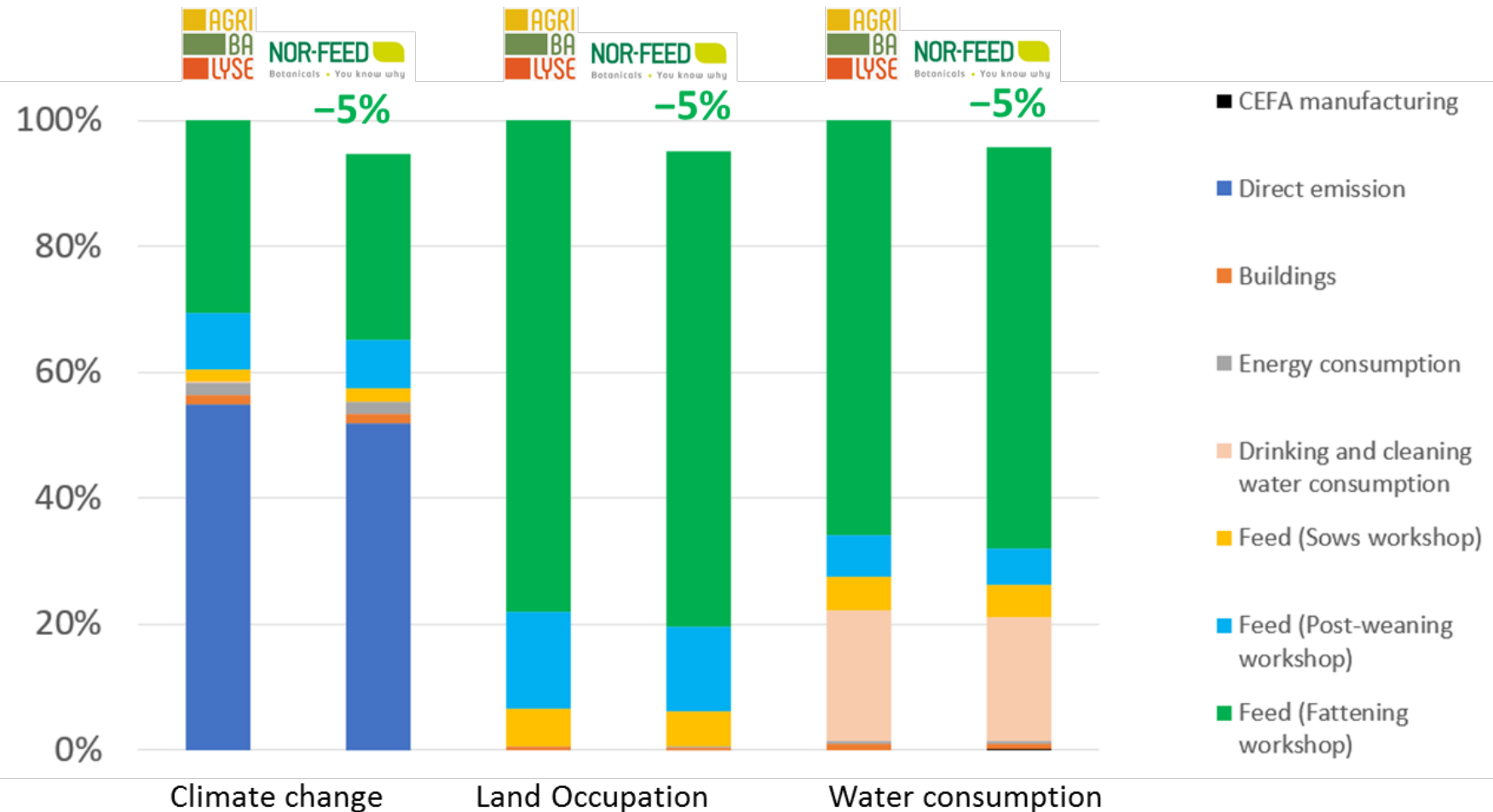
Take Home Messages



Functional unit 2: produce 1kg of animal (live weight) fed with (vs. without) CEFA.



Environmental gain du to the use of CEFA in pig production



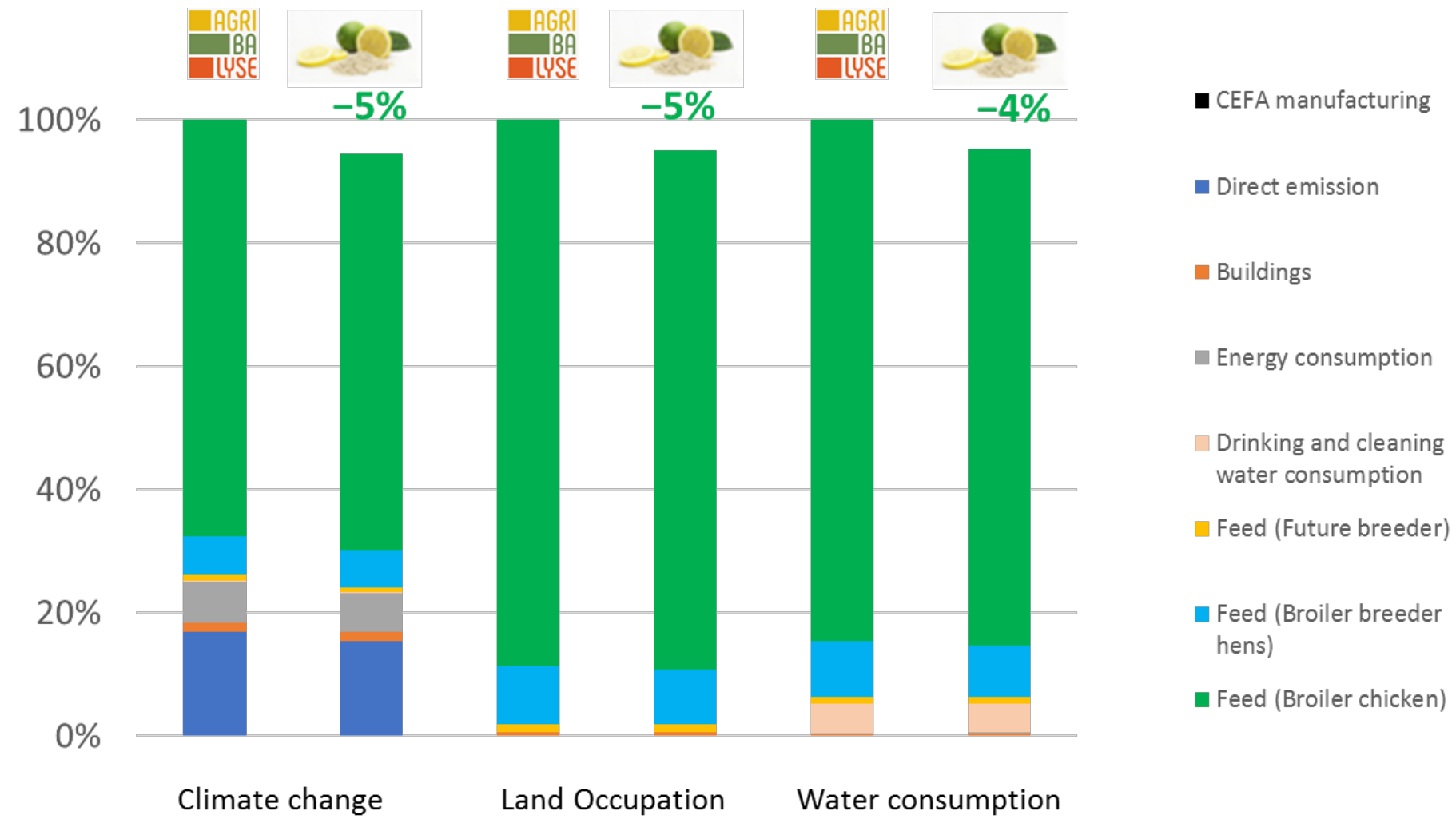
Environmental gain mainly resulted from the reduction in the quantity of feed consumed to produce the same amount of animal live weight.

+ 11.7 % ADG ($p < 0.001$)
- 6.8% FCR ($p < 0.001$)



Functional unit 2: produce 1kg of animal (live weight) fed with (vs. without) CEFA.

Environmental gain du to the use of CEFA in poultry production



+ 5.3 % ADG ($p < 0.01$)
- 2.5% FCR ($p < 0.02$)



Conclusion

For more sustainability, it is crucial to evaluate and reduce both the emission of greenhouse gases and the resources needed for their production.

The improvement of feed efficiency is a promising solution to reducing the environmental impact of livestock farming

Environmental gain due to CEFA supplementation mainly resulted from the reduction in the quantity of feed consumed to produce the same amount of animal live weight



animals



Article

Mitigating the Environmental Impacts from Pig and Broiler Chicken Productions: Case Study on a Citrus Extract Feed Additive

Hoa Bui ^{1,2,*}, Sekhou Hedaly Cisse ^{1,2}, Mathilde Ceccaldi ³, Aurélie Perrin ³, Mohammed El Amine Benarbia ^{1,2} and Pierre Chicoteau ^{1,2}

Introduction

Material & methods

Results

Conclusions

Take Home Messages



Take-home messages:

LCA method is a good tool to evaluate the environmental footprint of feed additives.

The use of by-product appears to be a promising solution in terms of improving growth performances while reducing environmental footprint.





Thank you for your attention