



**Organic World  
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## How could livestock farming maximize organic production at a global scale?

**Marc BENOIT** (marc-p.benoit@inrae.fr)

INRAE, France

Bertrand Dumont, Piétro Barbieri, Sylvain Pellerin, Thomas Nesme

# Services provided by livestock

Food



Soil fertility



Housing



Energy



Work



Gastronomy  
Culture  
Landscape



Feeding the world



Feed/Food competition



Agroecology - Diversification  
Mix - livestock      Crop - Livestock



# What (multi) performance expected when implementing OF principles?

1- Many studies show that OF provides many benefits for society:

Environment, Global health including Human health, Biodiversity, employment etc.

(but the advantages are less clear on some aspects, as climate change)

*Reganold et al 2016, Schader et al 2012, Bourguet et al 2016, Baranski et al 2014, Baudry et al 2017, 2018, 2019*

2- However, OF's productivity is globally significantly lower compared to conventional's one

*(Seufert et al 2012, Ponisio et al 2014)* → **this is the « black point »**

*Searchinger et al 2018, Kirschman 2019, ...*

→ A dilemma: How to produce “clean” with the same agricultural area while feeding everybody at world scale?

# Producing « clean » ( /synthetic inputs) ...while satisfying human feeding requirement ? (productivity) HOW?

## 6 major levers

1/ Demographic management (Long term)

2/ Reducing losses and waste

3/ Limit other uses of agricultural land

Energy, Housing/building (land use), Mobility → Global issue - What policies?

4/ Increase cultivated areas (deforestation; northern latitudes)

5/ Ensure sufficient productivity of agricultural land

6/ Adapting human diets

# 1

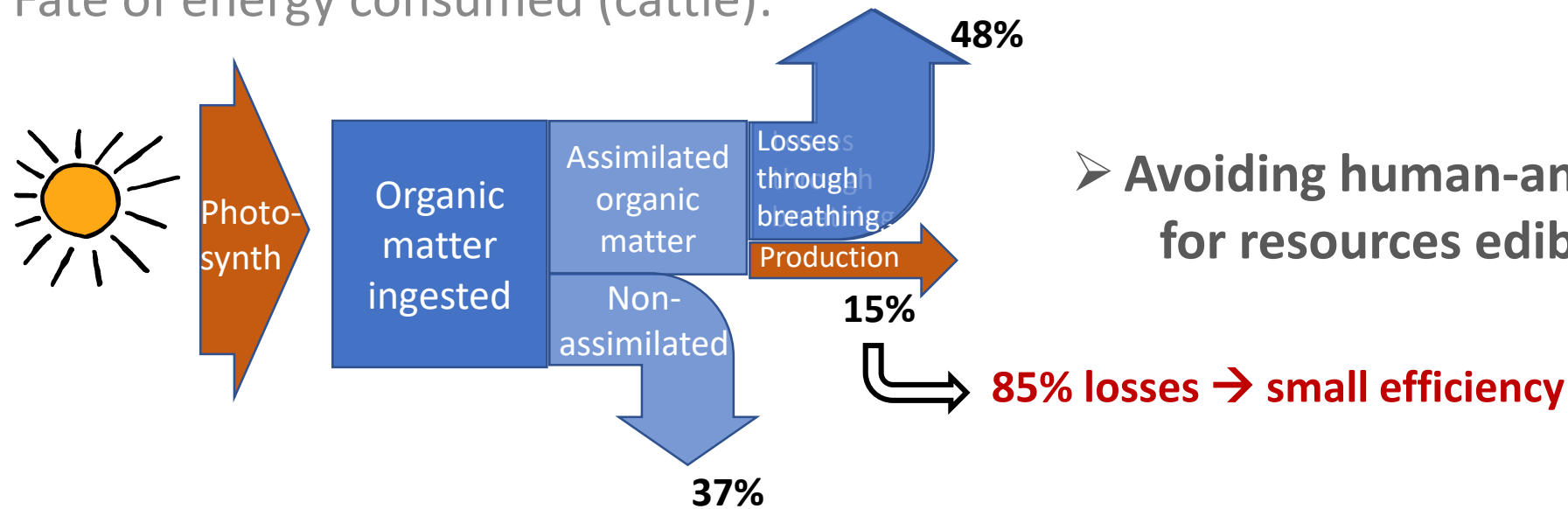
## Diets:

Less animal products in order to feed more people

# Why is the consumption of animal products "sub-optimal" compared to the human consumption of plant products?

## Energy loss along the trophic chain

Fate of energy consumed (cattle):



➤ **Avoiding human-animal competition for resources edible by humans**

World crops for livestock = 500 million ha = 1/3 of crops



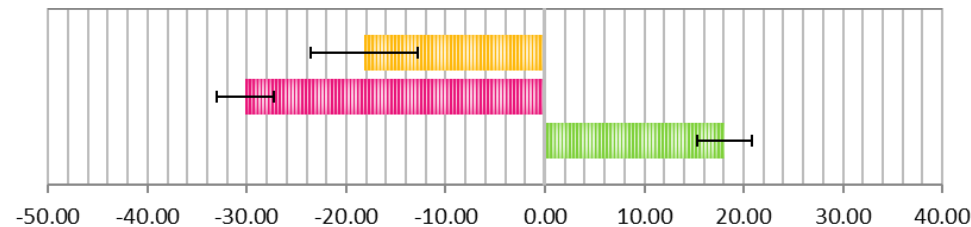
# Consequence: Effects of the diet (animal products share) on the agricultural area needed for a consumer. Comparison OF / CA

Consumer Cohorts Q5 vs. Q1

*Baudry et al 2019  
(BioNutrinet)*

**Big vs small consumers of organic products: Q5 vs Q1**

Land use



*Global effect*

*Diet effect*

*OF vs CA effect*

Despite 18-20% lower yields on OF, and thanks to a diet that relies less on animal proteins, the French organic consumer uses 18% less UAA than a conventional consumer

➤ ... Suppressing livestock to produce "sustainable" and feed the entire population?



2

Agronomic optimization:  
« husbandry wisely »



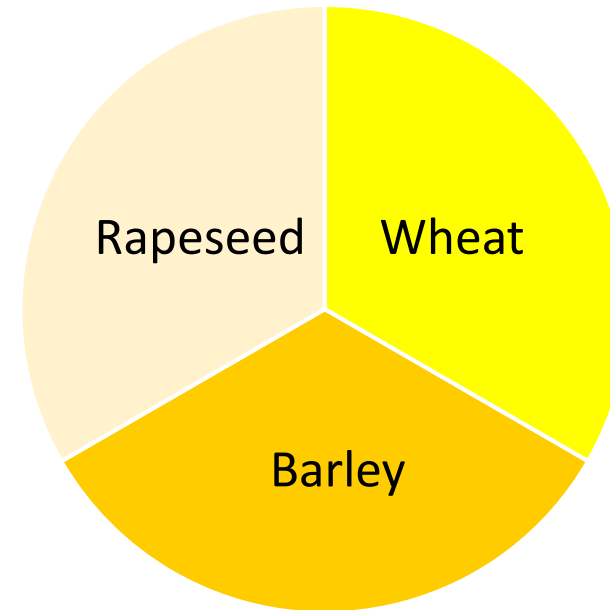
## Simplified rotation in specialized agriculture:

**Chemical nitrogen**

→ **Climate change, fossil energy**

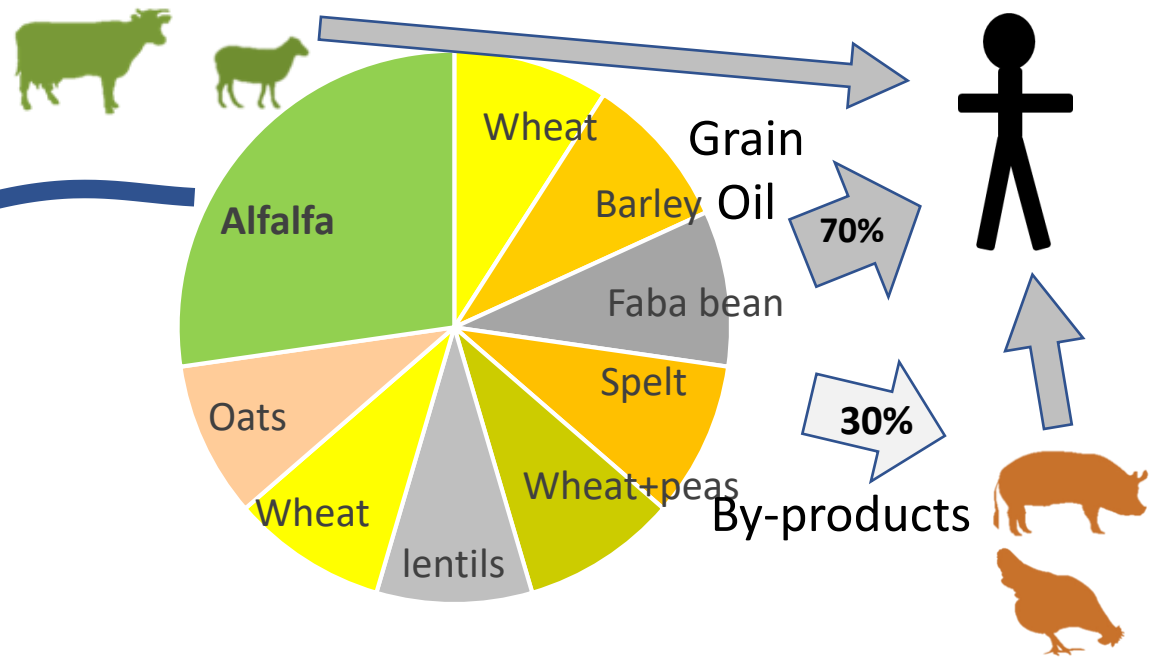
**Pesticides** (diseases, pests, weeds)

→ **Loss of biodiversity, water pollution, human health**

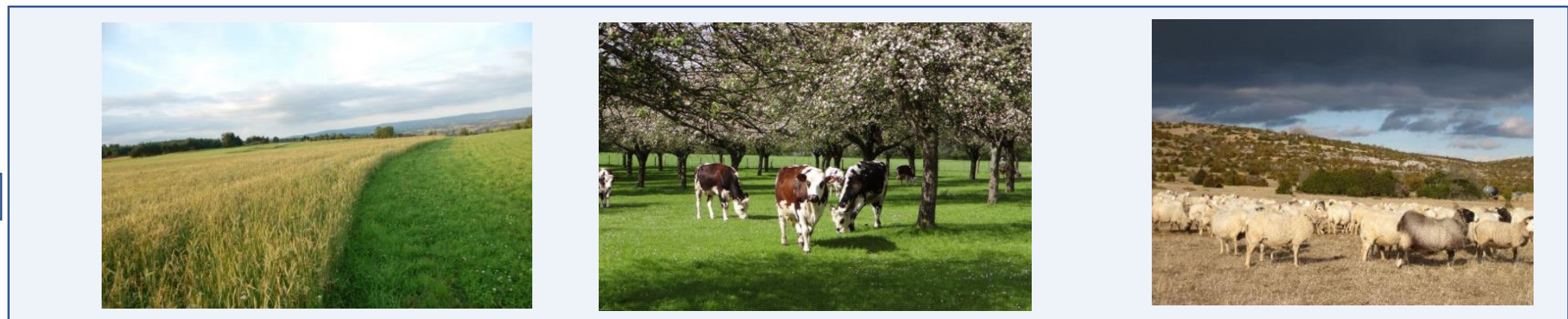
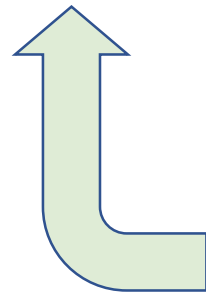
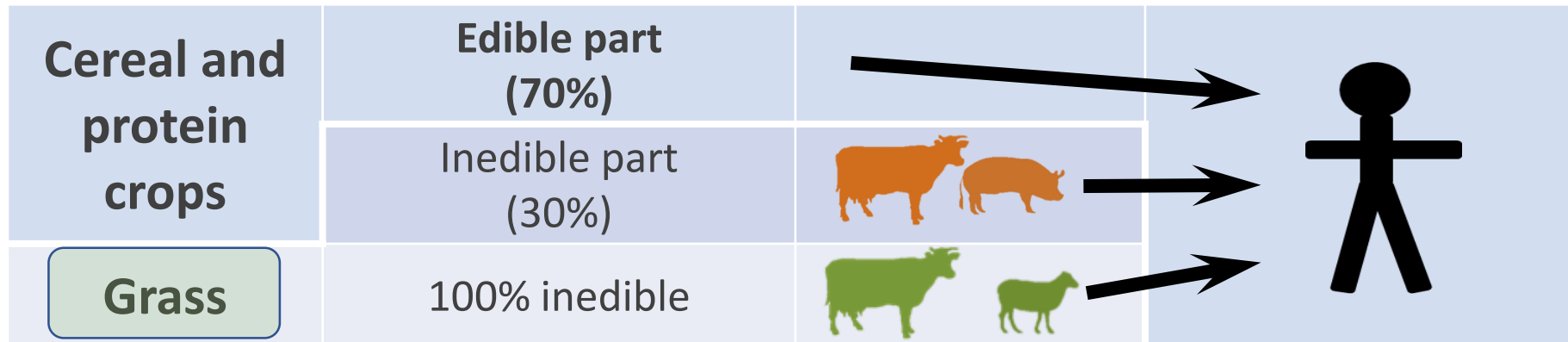


→ increase complexity and include fodder  
in the rotation to limit/remove synthetic inputs

**Fixing atmospheric nitrogen**  
**Break the cycles**  
Diseases - Pests - Weeds  
**Structure the soil and**  
explore deep horizons



# Maximization of the agricultural production for humans, avoiding feed-food competition



## 3

Overall:

What share of agriculture production should come from livestock  
...to maximize the population fed?



# Maximization of the population to be fed: an optimum of livestock in the UAA

Example: Netherlands *H. Van Kernebeek et al 2014*

Land and resources are optimally used if 12% of proteins  
are of animal origin

No Human/Animal competition

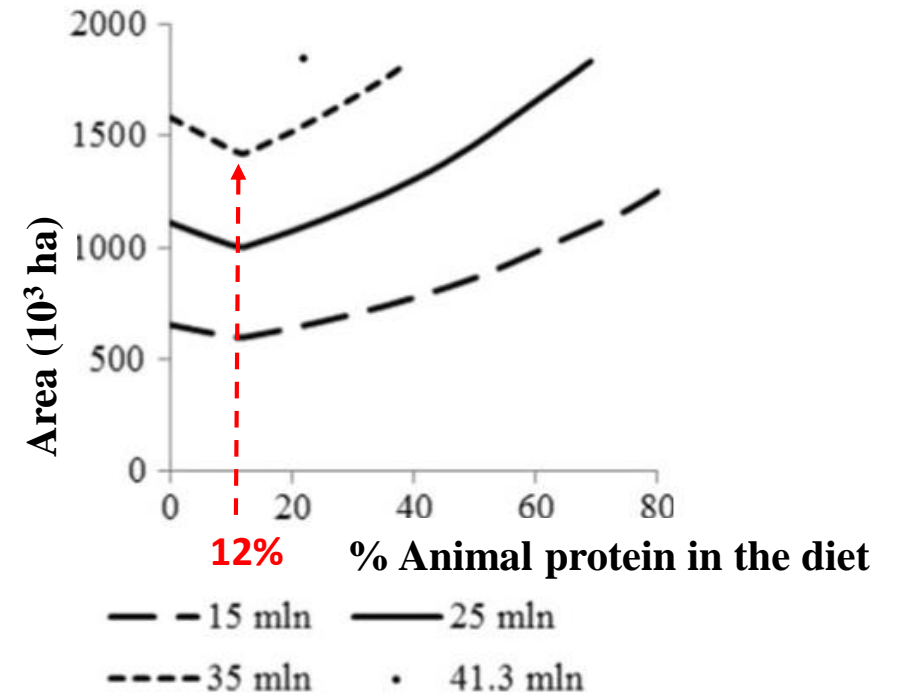
**The level of this optimum fluctuates according to**

The perimeter taken into account (country, territory...)

The pedoclimatic context

The technologies used

In France: around 25%



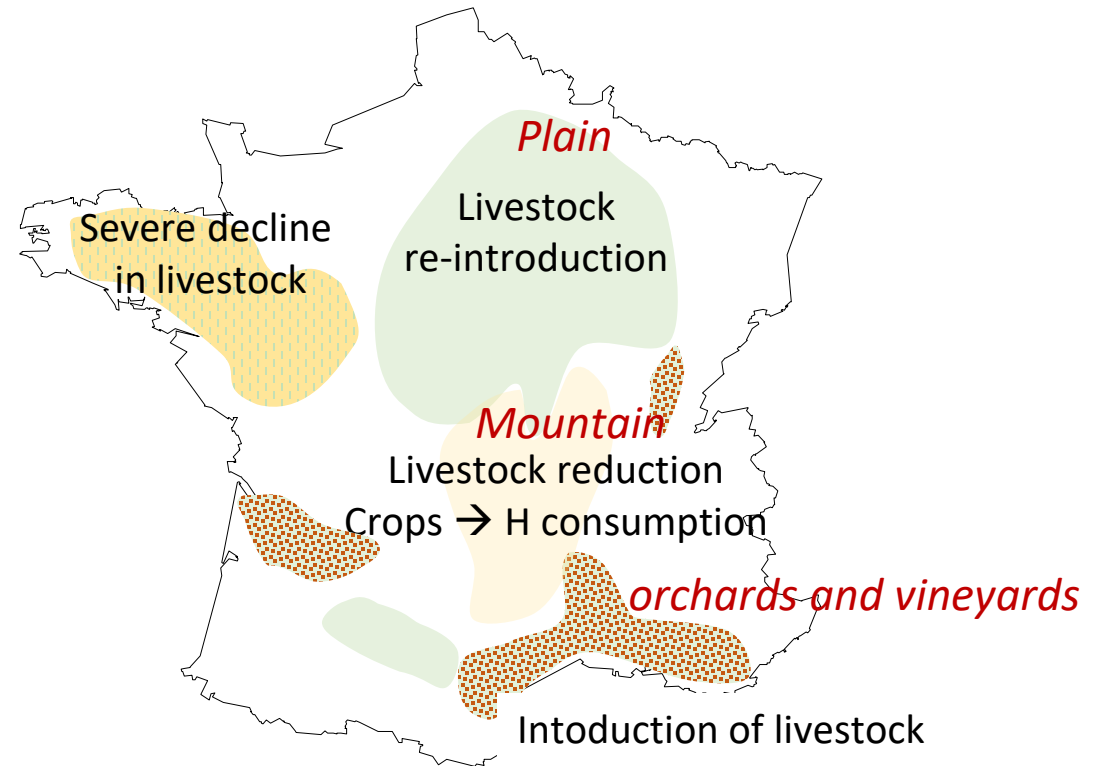
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# What consequences, for what future? France as an example

# An implementation of agroecology or OF at a large scale: Towards a large-scale restructuring of French agriculture

## Prospective studies to be undertaken

- Global agricultural production?  
*(crops, livestock etc.)*
- Environmental and social impacts  
*(jobs, income, health)*
- International trade
- Food sovereignty





# Conclusion



- From **global** issues ... to **local** solutions
- Sustainable food system:  $\searrow$  livestock share **and** revisit its functions/types/locations.
- Many challenges:
  - Available skills? (new productions, new systems, new services ...)
  - The traditional industries: how to integrate them into this process?
  - How to manage diversification and heterogeneity of the products?
  - What future for territories that have relied on a concentration economy?
- **The territory:** crucial scale for understanding and implementing the transition lead by agriculture, with major stakes as food security, added-value, resilience, social issues



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**Thank you!**

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