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How could livestock farming maximize organic production at a global scale?

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Theix, 8th and 9th July 2021

GREENANIMO

Farming systems training

How could livestock farming maximize organic production at a global scale?



Marc Benoit

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Services provided by livestock

Food



Soil fertility



Housing



Energy



Work



Landscape



Gastronomy & culture



Livestock at the core of major issues and debates



Climate change

Mitigation and carbon sequestration

Adaptation



Animal welfare

Human health (+ or -)



Livestock farming and major issues with regard to OF

Agroecology: diversification



Croop / Livestock



Agroforestry



Feeding the world



Feed/Food competition



Implementation of agroecological and OF principles

What (multi) performances expected?

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?

**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

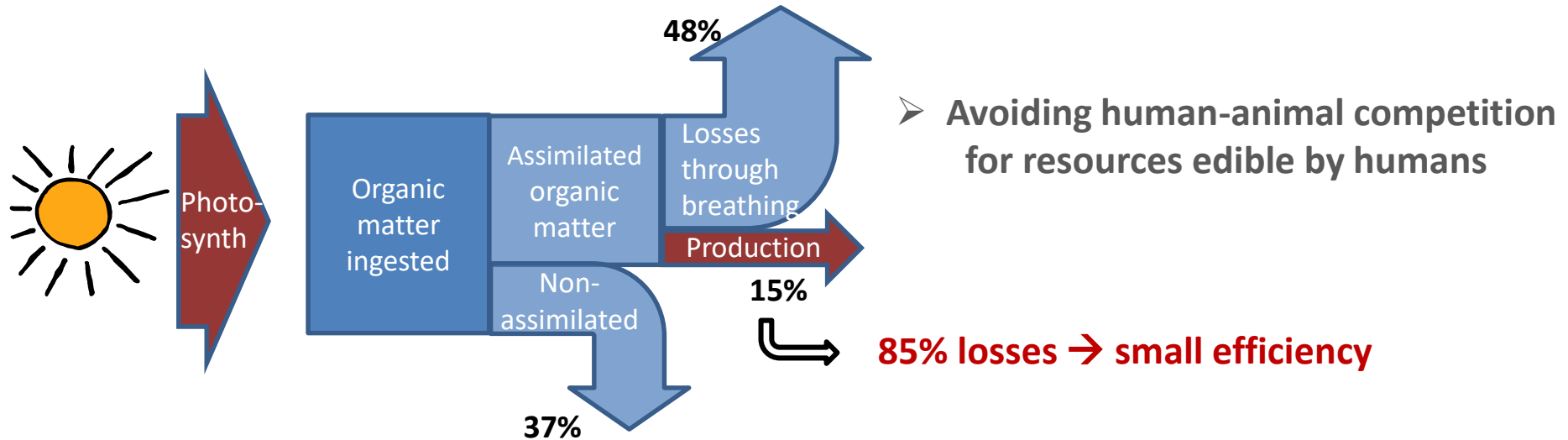
Diets:

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):



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

Consequence: Effects of diet (animal products share) on sustainability indicators

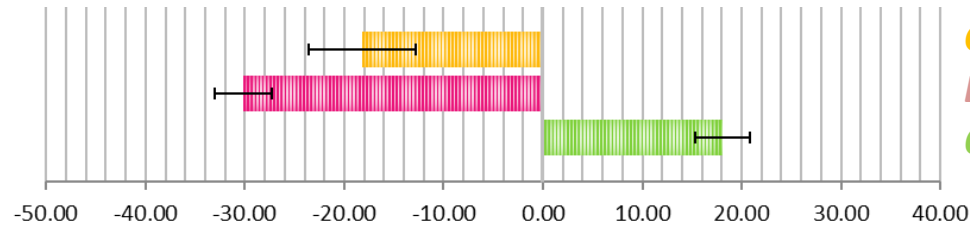
Comparison OF / CA

Baudry et al 2019
(BioNutrinet)

Consumer Cohorts Q5 vs. Q1

Big (Q5) vs. small (Q1) consumers of organic products

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:

« Breeding wisely »

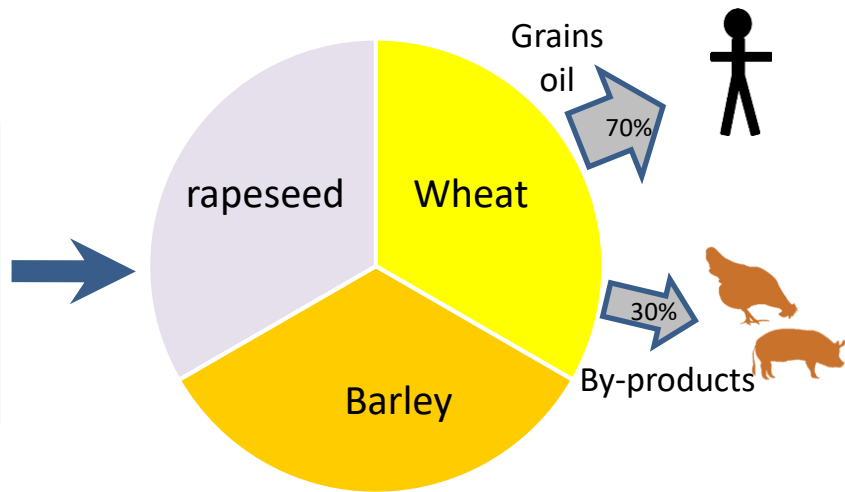
Simplified rotation in specialized agriculture:

Chemical nitrogen

→ **Climate change, fossil energy**

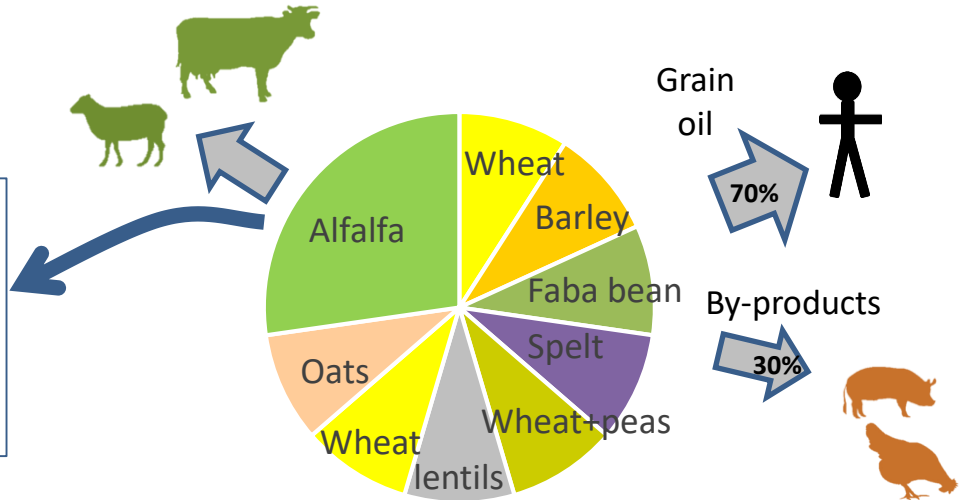
Pesticides (diseases, pests, weeds)

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









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

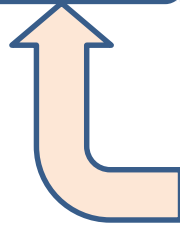
Fixing atmospheric nitrogen
Break the cycles
Diseases - Pests - Weeds
Structure the soil and explore deep horizons



Optimize (maximize) agricultural production for humans

Avoiding feed-food competition

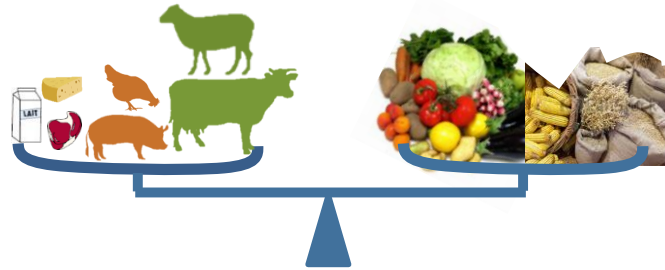
Cereal and protein crops	Edible part (70%)		
	Inedible part (30%)		
Grass	100% inedible		



3

Overall:

What share of agriculture production is coming 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

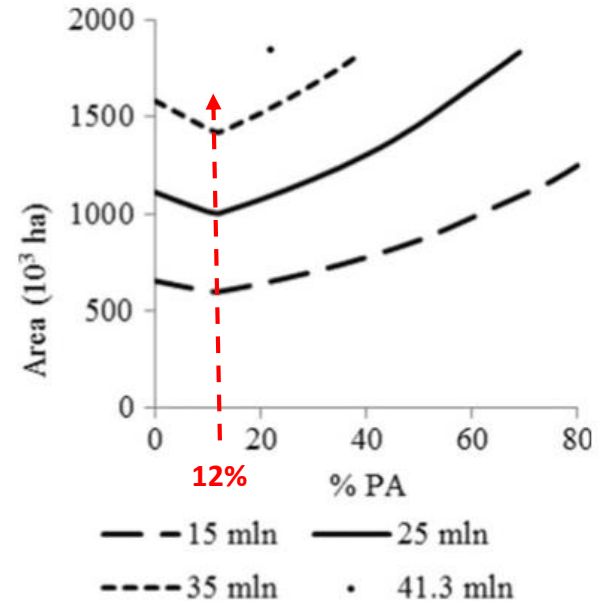


Fig. 2 Minimum land (10³ ha) needed for feeding the total population with diets varying in percentage of dietary protein from animals (% PA) in the reference situation. *mln* million

→ What kind of breeding?

Genotypes?

Type of products?

What farming systems?

Where?

4

What futur?

France as an example

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

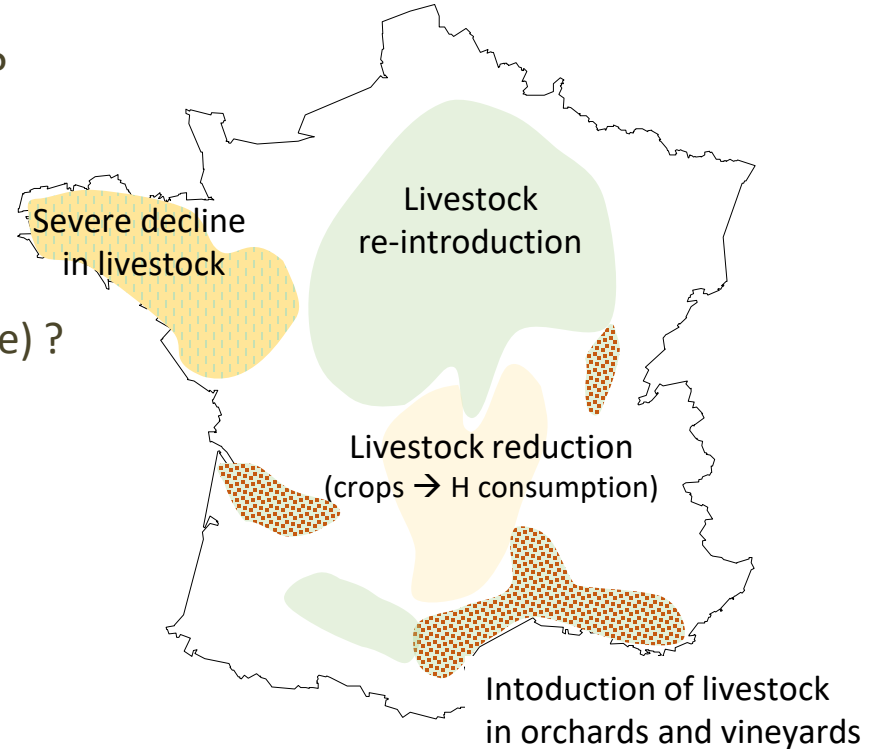
- What is the importance of crops in the end?
- What about monogastrics?
- What about imports/exports volumes?

Prospective studies to be undertaken

- Global agricultural production (quantitative) ?
- Environmental impacts
- Social impacts (jobs, income, health)
- International trade
- Food sovereignty

Under various assumptions about

- Level of food waste
- Share of animal proteins in the diet
- Share of organic farming in agriculture and cons.



Re-spatialization and diversification of the agriculture in the territories

Conditions and consequences

- Available skills? (new productions, new systems, new services ...)
- Creation/development of upstream and downstream industries
- What is the future for territories that have relied on a concentration economy?

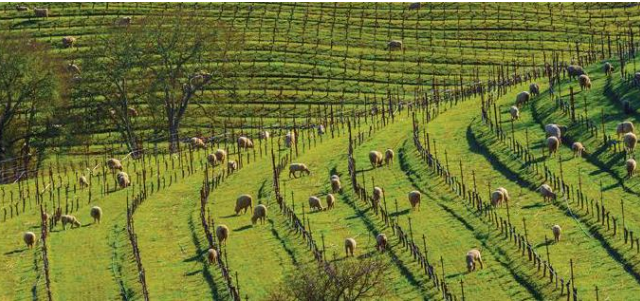
Opportunity: the agriculture to support territorial dynamics

Many initiatives of PAT (Territorial Food Projects)

Combination of stakes: food security, added-value, resilience, social...

Conclusion

- From **global** issues ... to **local** solutions
- Sustainable food system: \searrow livestock share **and** revisit its functions/types/locations.
- **Externalities**: not part of the economic sphere (in the short term) ... but a **fundamental element** in the medium-long term
- The "**classic**" **industries**: how to integrate them into this process and this reflection?
Diversification and heterogeneity of the products. Re-link agriculture to the consumer...
- **The territory**: crucial scale for understanding and implementing the transition:
environmental and **socio-economic impacts, food sovereignty challenges**
+ implementation of local policies, interaction between actors and decision-makers



*Patrick Webb et al,
Nature Food, Sept 2020*

**The urgency of food system
transformation is now irrefutable**

