Livestock is essential for sustainable agri-food systems

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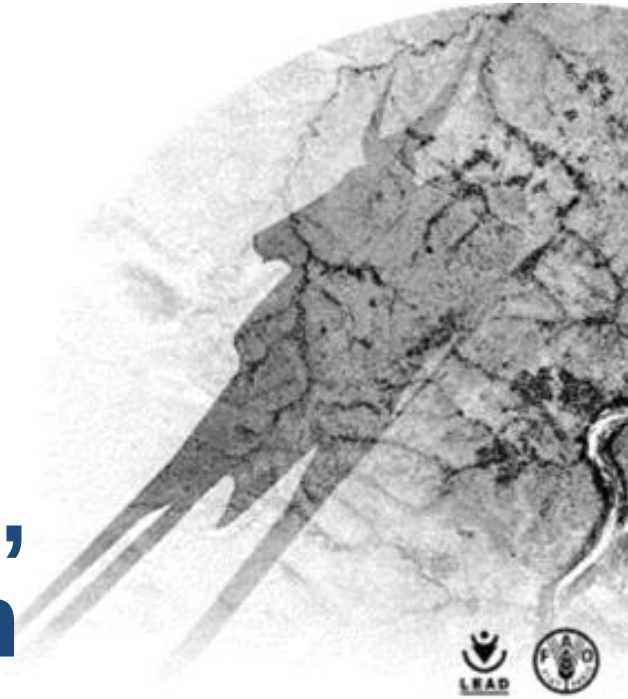


Part 1:
Beyond simplified assumptions, towards a more balanced vision to find the right solutions

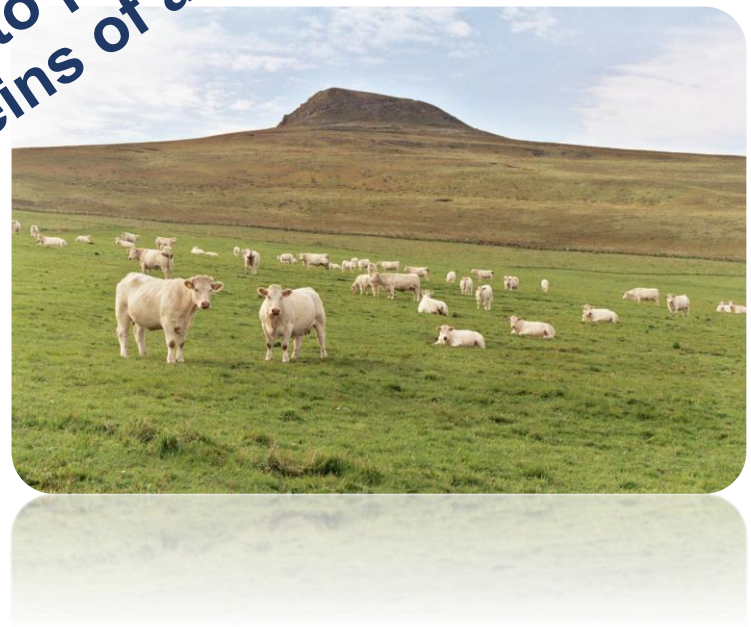
Food from marginal lands? Ruminants can do!!!

- In Europe, permanent grasslands and rangelands cover 73 M ha (40% Eu AA)

- 360 M cattle and 600 M small ruminants provide 25% of world animal product from marginal land

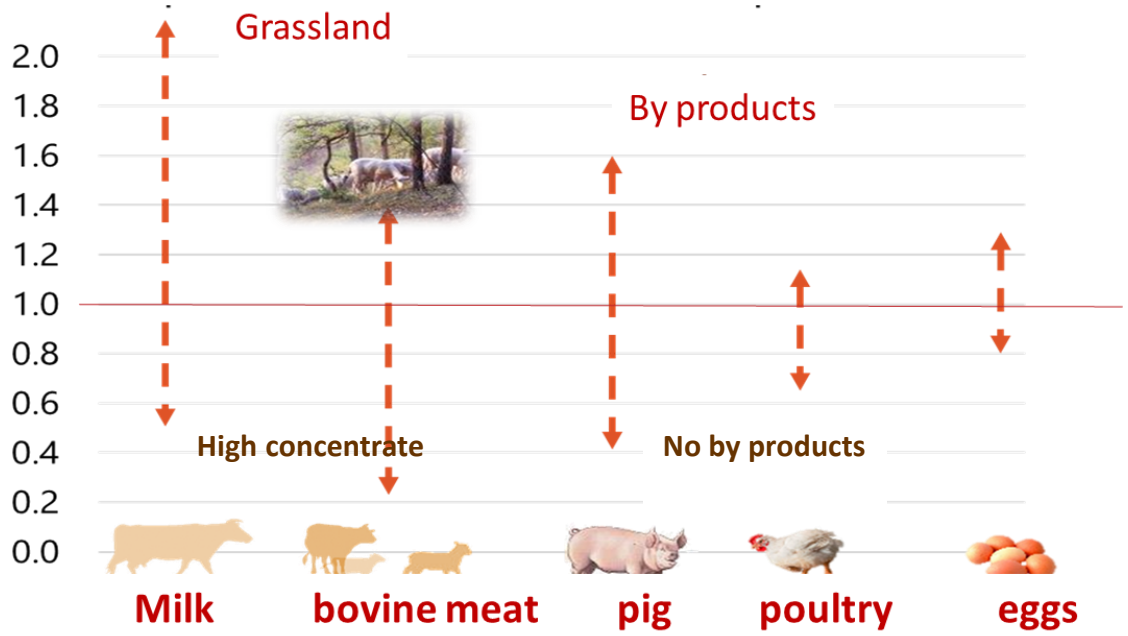
Livestock between Food and Feed!

10 kg of protein of plant origin to produce 1 kg de proteins of animal origin



- **But 86% of protein consumed by livestock are not edible as human food** *Mottet et al., 2018*

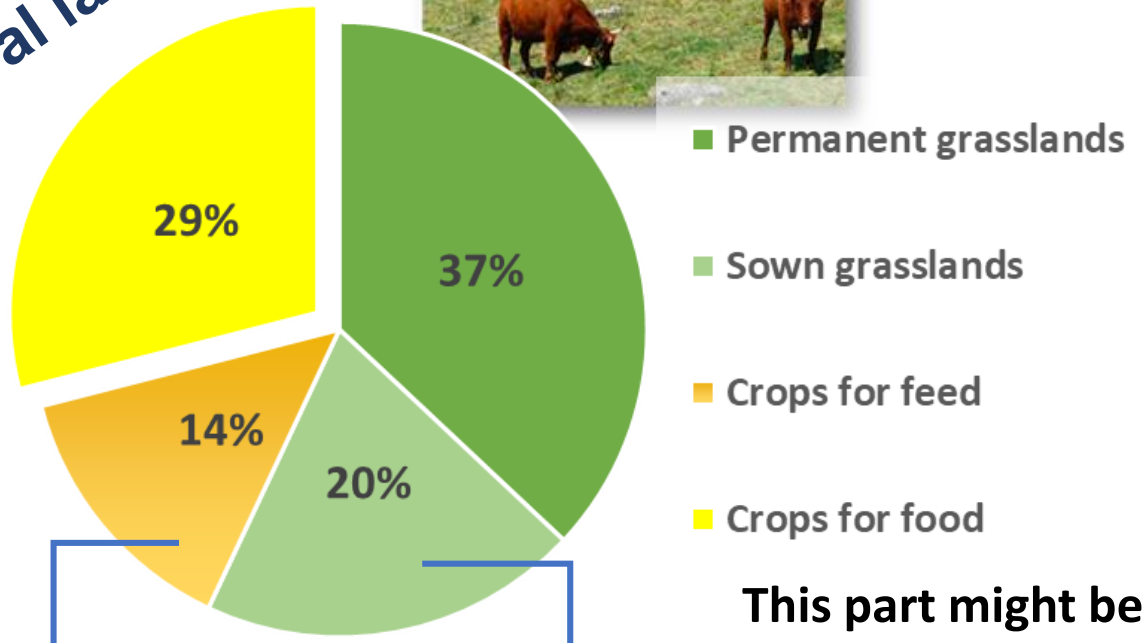
Kg of protein of animal origin per kg of edible plant protein used as feed



Laisse et al., 2018

Land use : a more complex issue than often claimed

Livestock use 70% of agricultural land



This part is questionable but plays an economic role for crop producers

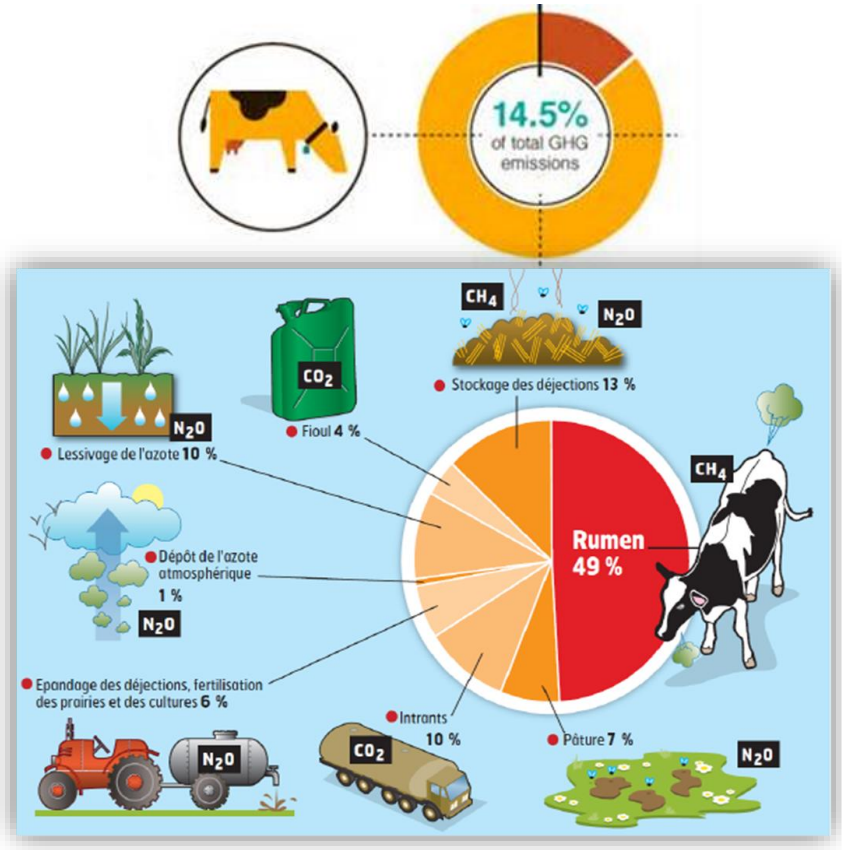
This part might be used for crops production but it ensures the provision of services for an agro-ecological agriculture

Mottet et al., 2018

Ten Years For Agroecology **IDDRI**

Real Carbon footprint of ruminants

Methane is the consequence of the unique ability of ruminants to use cellulose (80% of terrestrial carbohydrates) for producing high value food



- Improving animal feeding
- Genotyping low methane production for selection
- Improving animal health and husbandry conditions
- Developing smart use of manure,
- Developing biogas production
- Increasing C sequestration (grassland, agroforestry)
- Using Precision Livestock Farming
- Feed production (circularity)
  - More efficient production (legumes)
  - Better agricultural land use (rotations)
  - Less/no specific crop for feed production

EU 12: 40% reduction since 1990
An additional reduction of 40% in 2030

Contrasted systems to produce meat

14 - 18 kg CO_2 eq/kg

- Ecosystems services (+)
- Soil C sequestration (+) (up to 60% of C footprint)
- Use of marginal land (+)

5 kg CO_2 eq kg

- Ecosystems services (-)
- Soil C sequestration (-) (20% of C footprint)
- Added value from dairy (+)

We need both systems

(Dollé et al, 2015)

The links between dairy and beef sectors should be coherently addressed

Is cow methane to blame for global warming?

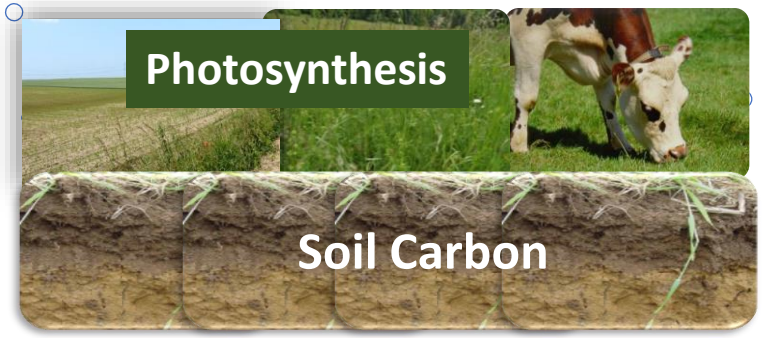
Adapted from Allen et al., (2018) - Nature

CO_2

Photochemical oxydation

Do not accumulate in the atmosphere so long emissions do not increase.

CH_4 CH_4



Fossil CO_2 accumulates in the atmosphere

CO_2

Fossil fuel
Old photosynthetic C
100-200 Million year old
(not in the C cycle)

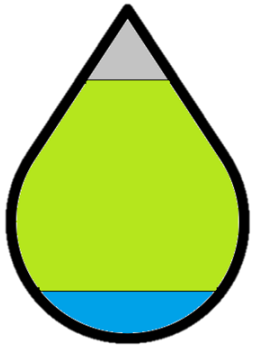
Using conventional GWPs to convert CH_4 to "CO_2-eq" misrepresents its impact on global temperature

To limit warming to 1.5 to 2°C (COP 21) : CO_2 emissions should be reduce to zero, CH_4 should be declining

Water consumption by livestock

15 000 L of water for one kg of red meat!

- **What are we talking about?**
  - **Green water (soil water consumed for crop cultivation): more than 95% is recycled**
  - **Blue water (surface water and groundwater)**



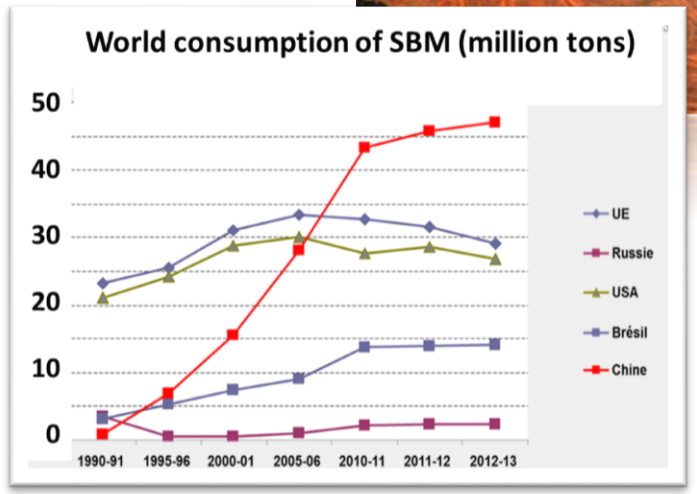
- **Livestock consume 8 to 15% of water resource worldwide (FAO, 2014)**
- **Comparison of farming systems**

1 kg beef meat	**50 – 520 L**
1 kg pig/poultry meat	190 L
1 kg milk	< 1 - 100 L
1 shower	50 – 70 L

Doreau et al. (2014)

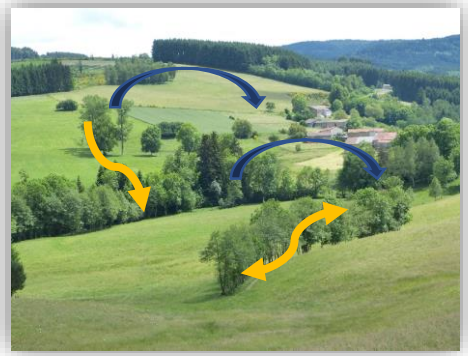
Ruminants can produce biodiversity

Intensive Livestock farming contributes to biodiversity losses!

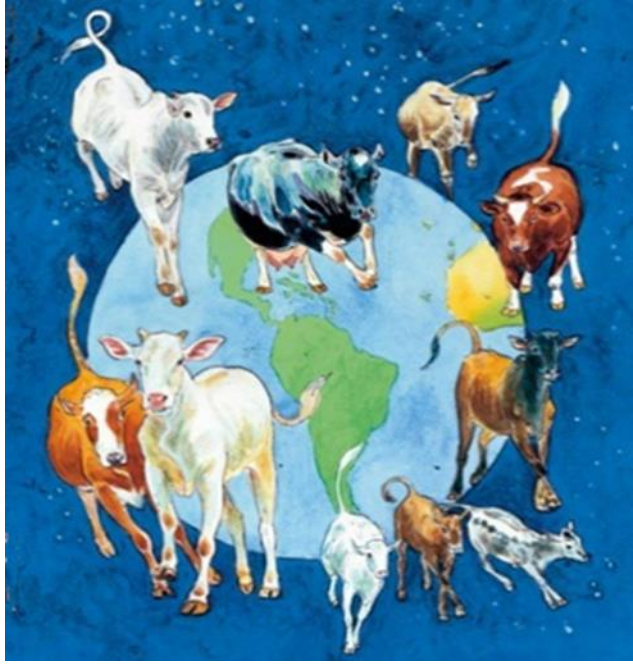


- **Diversity of forage species (including honey plants) and grassland types**

- **Diversification of land uses, landscapes and maintenance of open habitats (with grasslands)**

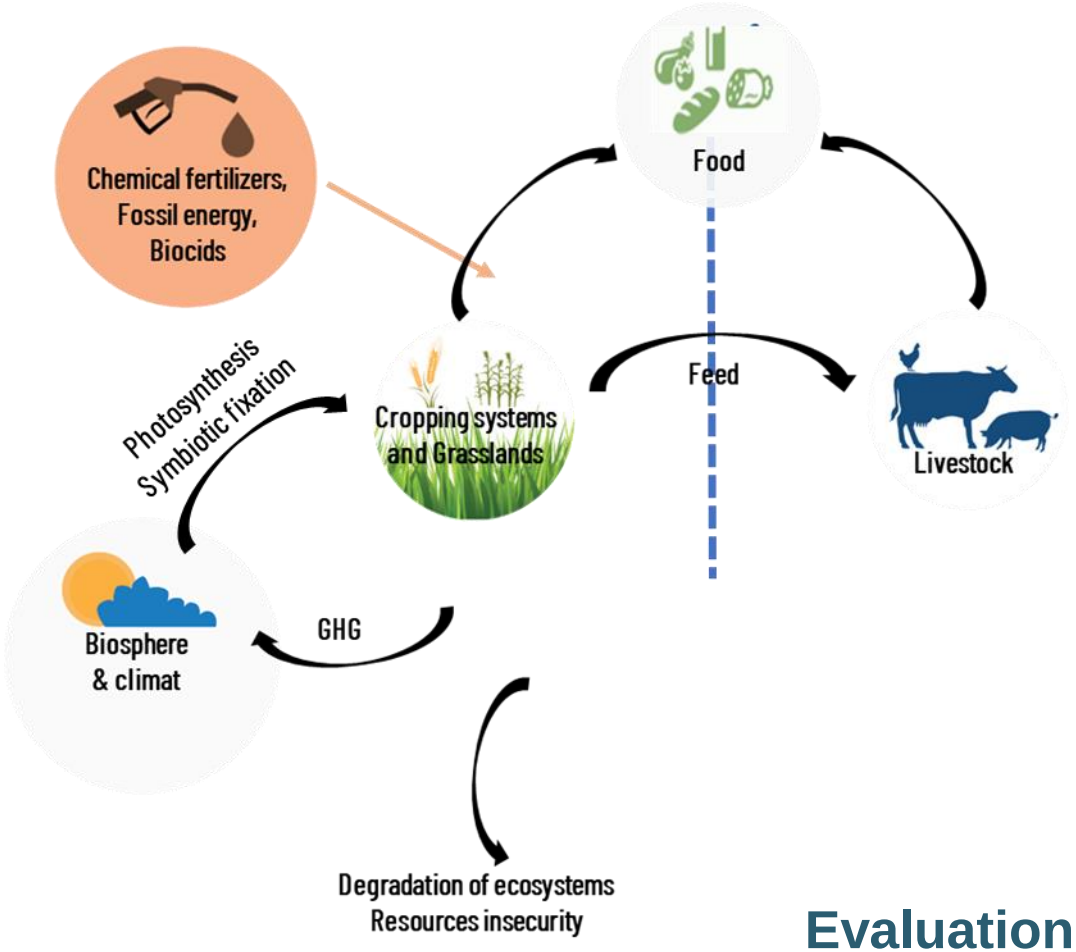


Biodiversity depends on landscapes management which presupposes ruminants (horses) promoting them



Part 2:
Changing paradigms: towards a renewed place and role of livestock farming in agri-food systems

The linear approach of agriculture



(resources –> production –> products –> wastes)

Systems have become more intensive
more specialised and spatially separated

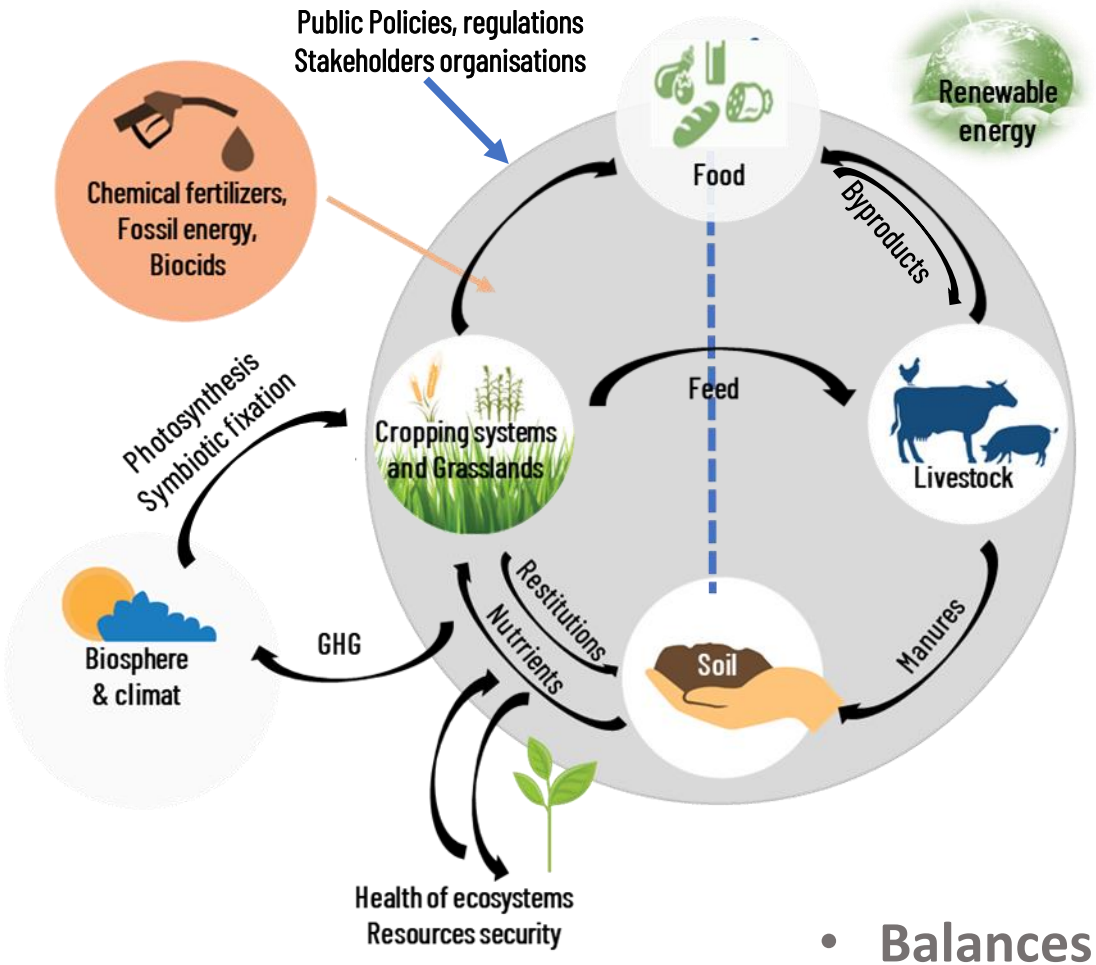
High levels of N outputs
GHG
Health and welfare issues

Monocultures
Mineral N fertilizer
Pesticides

Resource insecurity
Degradation of ecosystems
Loss of biodiversity

Evaluation of Livestock farming systems (LCA) also use linear approaches thus over estimating the impacts of livestock

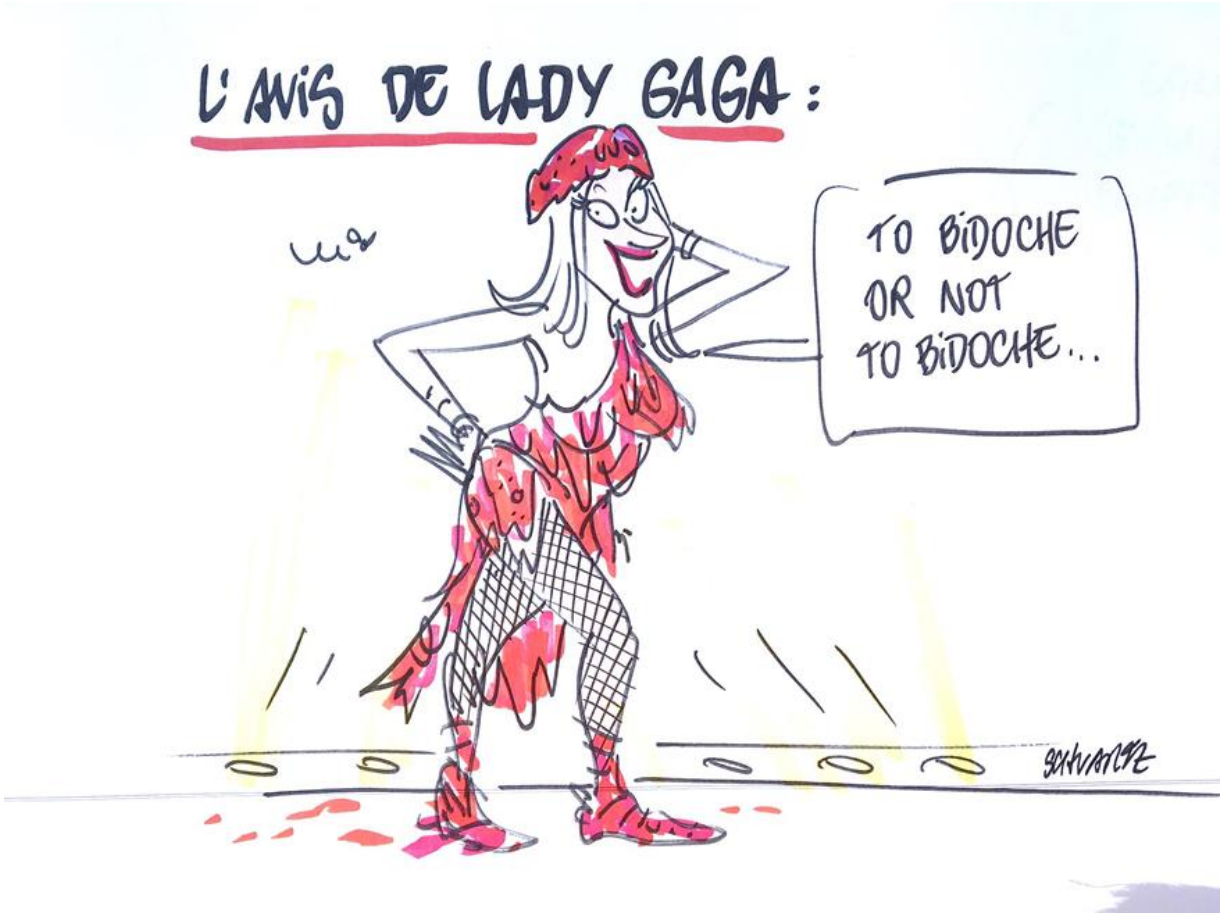
Changing the interplay between the sectors for a rejuvened agriculture

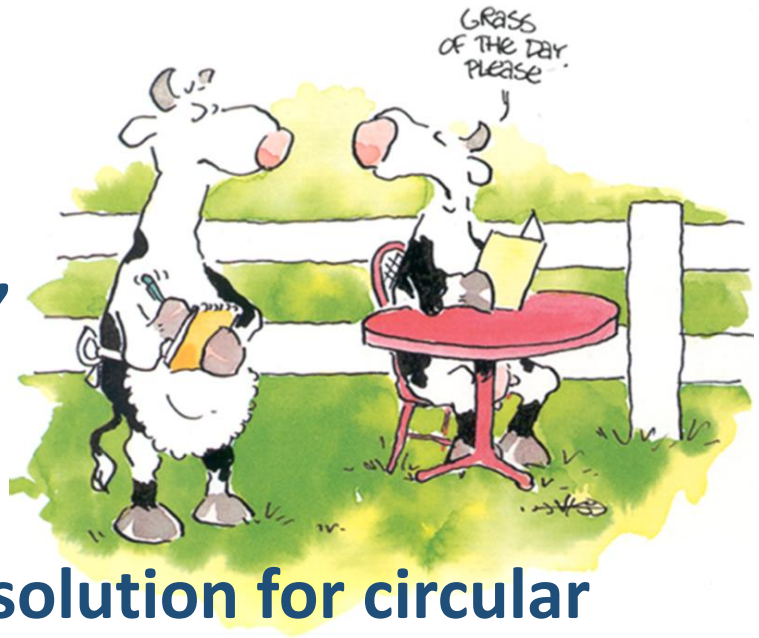


- **Crops diversification are facilitated by livestock**
  - Reduced EU dependency on imported P & E
  - Higher contribution to the energy transition
  - Mitigation of GHG of the food-chain
  - Reduced use of chemical inputs
  - Reduced crops for feed production
  - Increased soil C sequestration and fertility
  - Regained Health of ecosystems
  - Increased resilience of farming systems
  - Innovative models to share value-added
  - Proper evaluation of the roles, services and impacts of livestock

- Balances are to be found according to territorial contexts and politic choices. There is no « one size fits all » solution

Take home messages





- Think twice: do not step into a simple and narrow vision of ruminant/livestock farming systems,
- Reducing impacts of livestock farming is essential: the shadow of livestock can be mitigated,
- Livestock is not only a problem, it is also part of the solution for circular sustainable agri-food systems,
- Livestock farming systems should change to regain legitimacy, ruminant are designed to use grassland,
- Europe needs an ambition for livestock farming systems: articulate local and global, improvement or transformation? food production and/or immaterial functions (multifunctional livestock)?


Thank you for your attention