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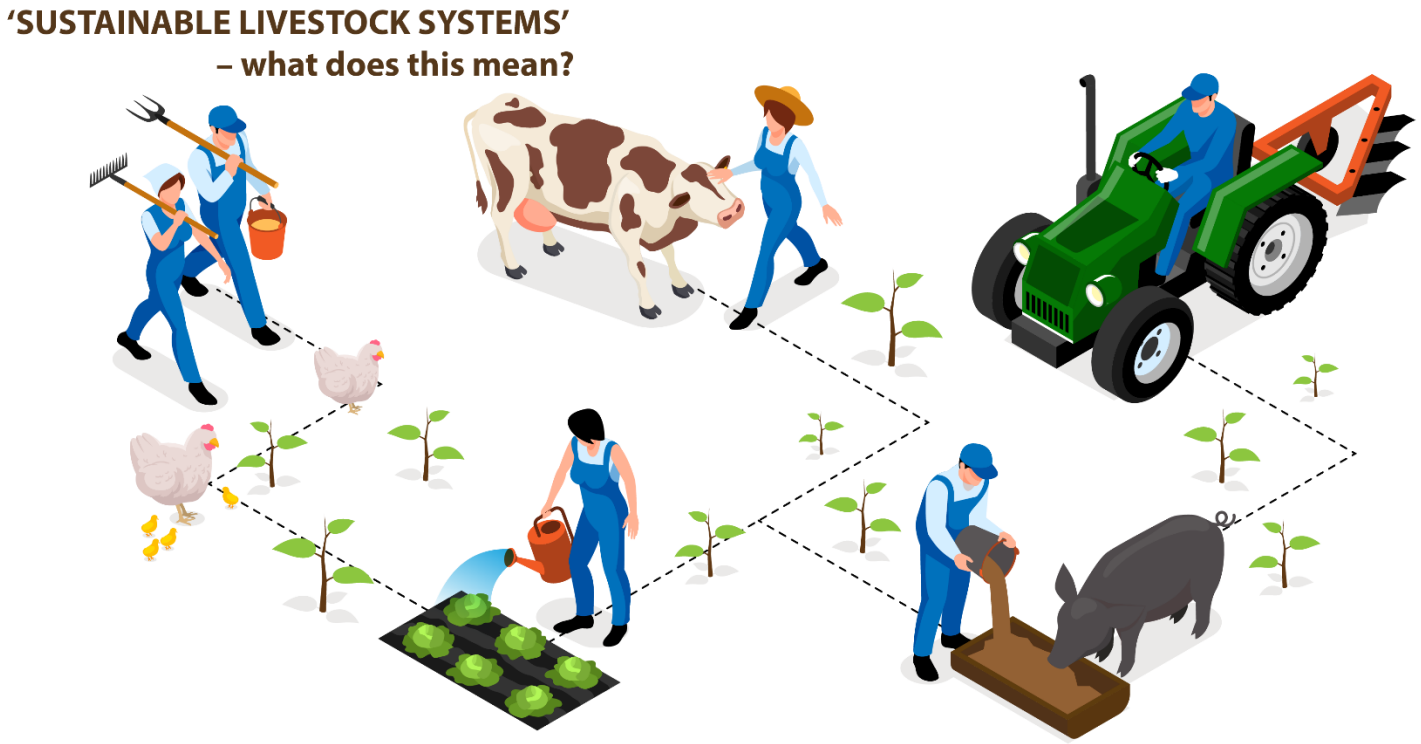
13th ATF Seminar

'Sustainable livestock systems' – what does this mean?



"Outcomes of the ATF-EAAP LFS Symposium,

August 28th, 2023:

Important messages & gaps in the discussion"

Jean Louis Peyraud

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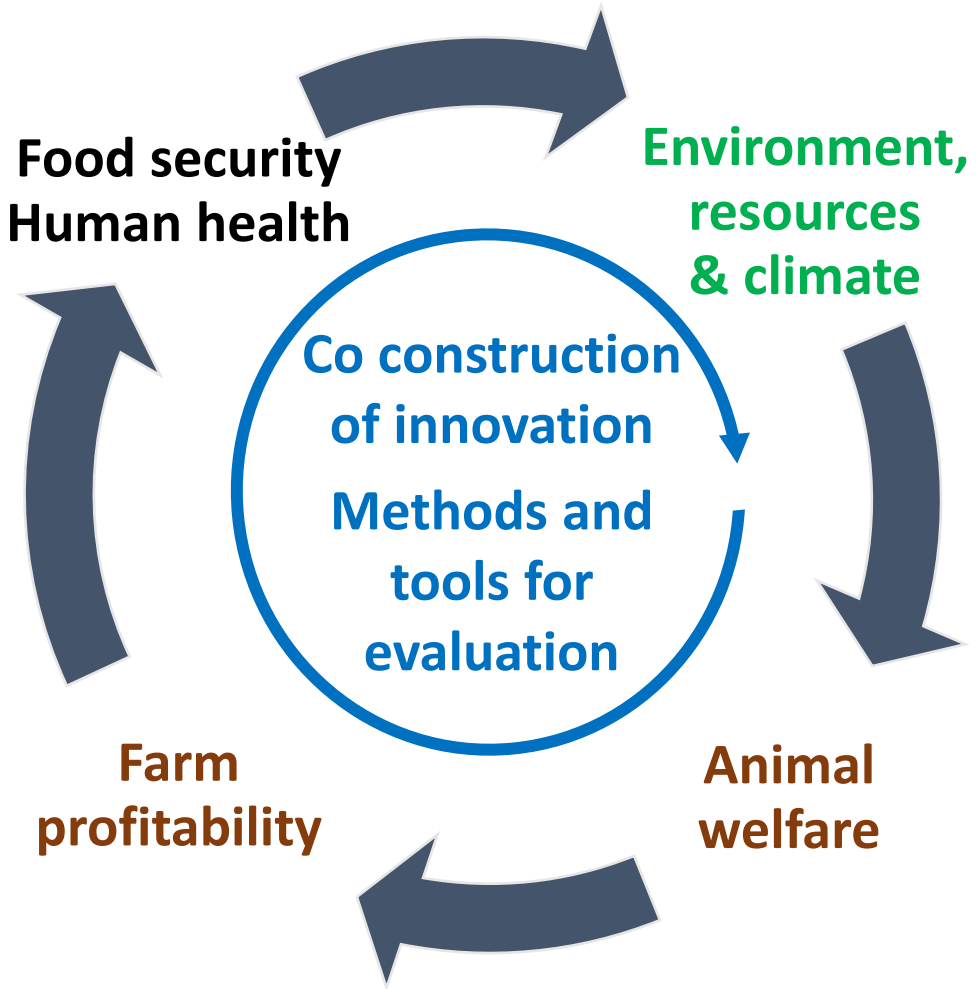
Sustainability issues that were addressed

- 18 oral presentations
- Introductory communication sets the scene *(Lutz Merbold et al)*
- A broad spectrum of topics
  1. Key attributes of sustainability **(1, 2, 6)**
  2. Co-construction of innovation (**3**)
  3. Methods to assess sustainability (**5**)
- No presentation on animal Health (there was a dedicated session at the same time)



http://animaltaskforce.eu/Topics/Sustainable-livestock-systems

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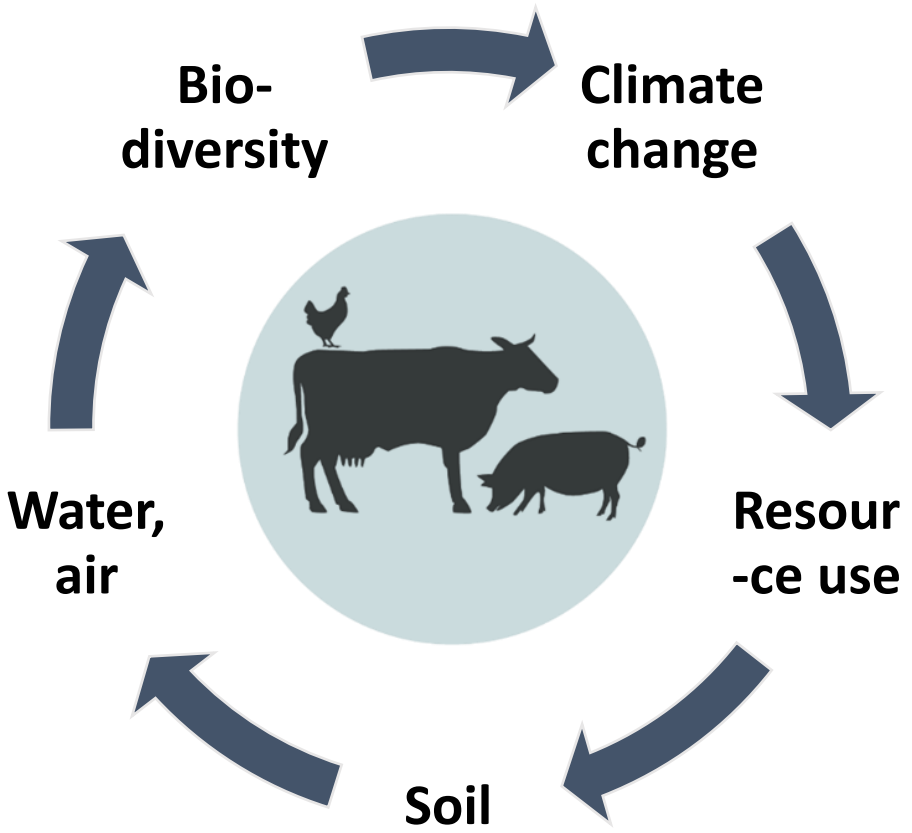
1. Environment: Limit shadows, enhance services

(Lutz Merbold et al; Leroy et al)

- **Habitat degradation**
- **Nutrient pollution**
- **GHG emissions**
- Habitat maintenance
- Nutrient cycling
- Soil C storage

- **Withdrawal,**
- **Nutrient Pollution**
- Quality,
- Regulation
- Mitigation



- **Nutrient losses**
- Soil fertility

- **GHG emission**
- **Feed production & LUC**
- Improved efficiency
- Soil C sequestration

- **Feed/food competition**
- **Land use & degradation,**
- **Deforestation**
- Non arable land
- Recycling of biomasses

Adapted from Beal et al., 2022

https://doi.org/10.1016/j.tjnut.2022.10.016

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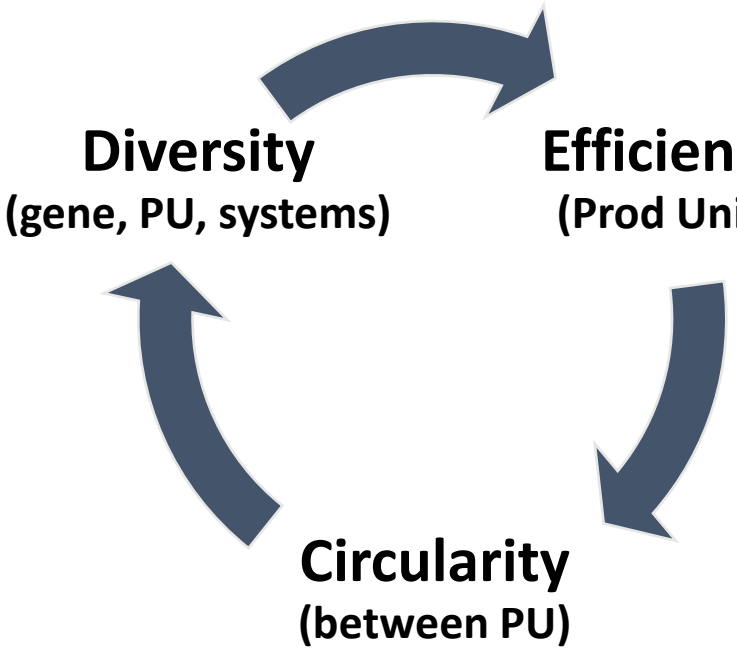
1. Three interconnected components for improving sustainability

- A goal: preservation of biodiversity
- A mean for increasing resilience and producing ecosystem services

3 communications
(2 benchmarking)

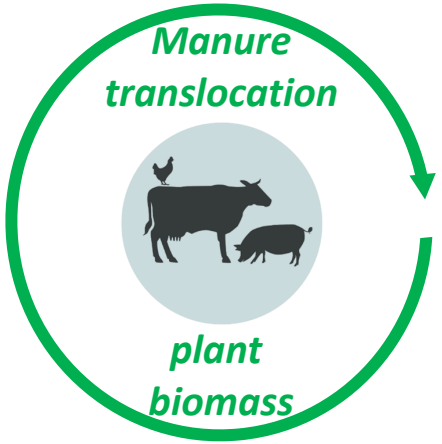


- Preservation of resource
- "Sustainable intensification"

5 communications

- Regeneration of ecosystems (closing natural cycles)
- Reuse of biomasses
- New synergies between livestock and cropping sector

2 communications



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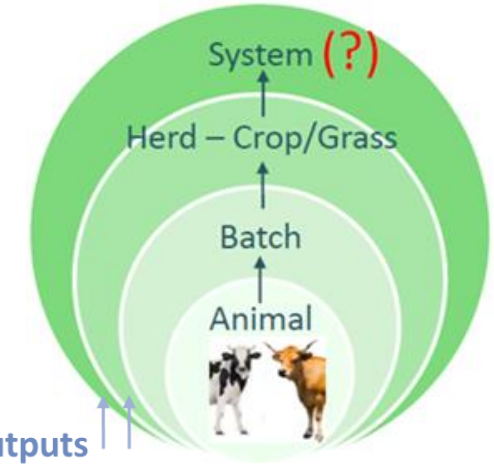
1. On what scale should efficiency be assessed?

Pieter Knap et al, Hieu Nguyen-Ba et al



- **From animal productivity… (intensification)**
  - Fewer animals for a given production, fewer emissions / kg products,
  - But, feed/food competition, lower robustness of animals

- **… to animal efficiency (sustainable intensification)**
  - Less emissions (NH_3, NO_3, N_20, CH_4) for a same production/animal,
  - A complex trait : NUE-pigs: FCR, RFI are proxy ; Dairy cow (kg milk/kg DMI?)

Outputs
Inputs

- **Efficiency gains at one level (e.g. animal) do not always carry over to a higher level of integration**
  - Need to integrate compensation and substitution between PU (circularity)

	Enteric methane	GHG at the system level
Conversion of a dairy farm to OF	**+ 12%**	**- 9% (on farm and off farm feed production)**
More milk per cow	**-**	**+ More beef systems (unchanged red meat demand)**

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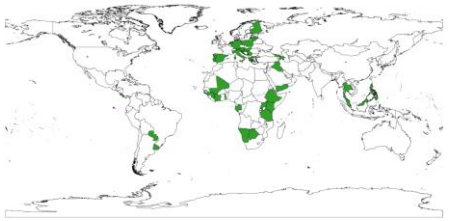
1. Circularity and diversity for the provision of ecosystem services

(R Baumont et al)

- **Livestock as a biocontrol tool for permanent crops (France)**
  - Animals for managing weed, pest, diseases and herbage mass in orchards
  - Benefits (less chemical treatments) and limits (damage on trees and soil)
  - Identification of knowledge gaps



G. Leroy et al

- **A diversity of species & breeds for a diversity of goals**
  - Domestic Animal Diversity Information System (37 species, 15000 breeds),
  - Native > Locally adapted > exotic breeds for regulating services (and sometimes for provisioning services)
  - Native breeds in extensive multipurpose systems vs exotic breeds/intensive

HEARTLAND
ONE HEALTH FROM SOIL TO SOCIETY

(Cecilia Ayala al)

- **Considering farm diversity to reduce impacts and increase profitability**
  - Farm survey of Irish beef and sheep sector (Ireland)
  - Need tailored intervention (no one-size fits all solution) : Farms have different capacities and tools to contribute towards common goals

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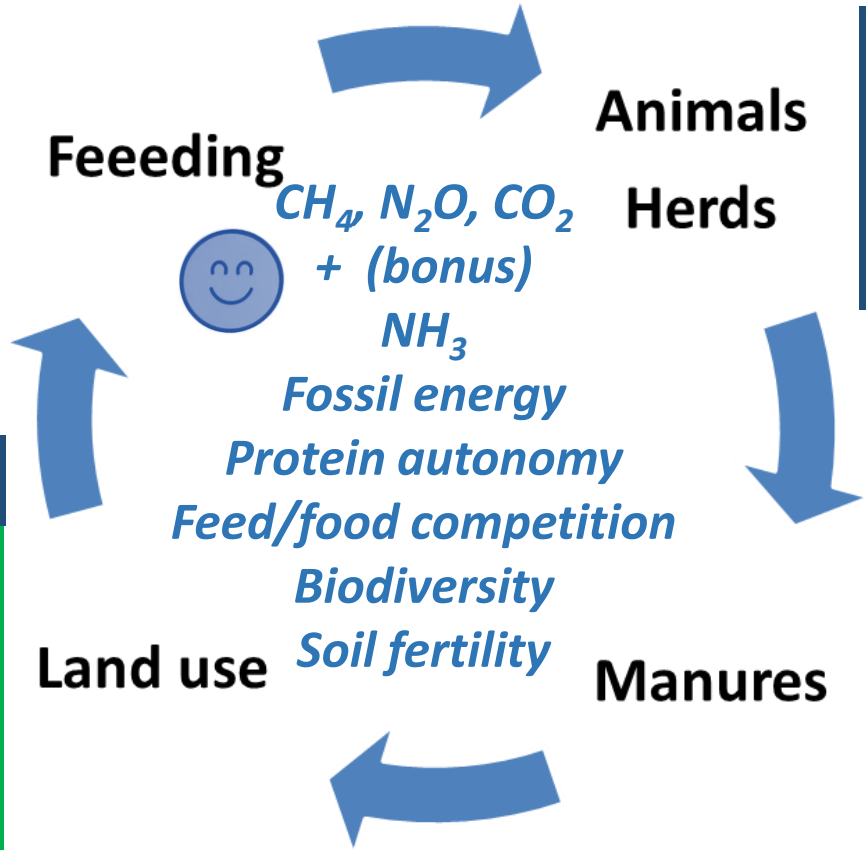
1. Efficiency and circularity hand in hand with positive trade-off

The case of GHG mitigation

H Nguyen-Ba et al ; Lutz Merbold

- Limitation of losses
- Precision feeding
- Feed additive
- Forages & grain legumes

- Grassland management
- Grassland in crop rotations
- N fixing plants
- Agroforestry
- Crop diversification and dual purpose crops



- Low emitting animals
- Animal robustness
- Meat from milk
- Slaughter age

- Smart use of Manure
- Bioeconomy of manure
- Biogas production
- Grazing

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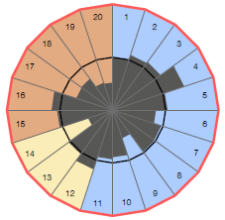
2. Co construction of innovation: two examples

SustAinimal
(Mårten Hetta)

- **Living lab in Sweden**
  - Development of technical references
  - Assessment of farmers' willingness to adopt innovation
  - Development of shared perspectives and knowledge



(Lotta Rydhmer & E. Röös)

- **Animal welfare index in sustainability assessments (Sweden, pigs)**
  - Animal species ability to perceive negative effects (AA): a public perception
  - An index of welfare level from 4 indicators
  - Welfare/kg diet = welfare level of the system x (0.25 x animal lives/kg food) x AA

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3. Sustainability assessment: Methods and data

(E de Olde et al, F Thorne et al)

- **3 types of tools**
  - **Ex ante for research or policy advice:** Models, data from farm surveys, databases
  - **Ex post for farm advice or research** : farm assessment tools, indicator sets, interview
  - **LCA:** environmental impact per kg product
- **A proliferation of tools and indicators with several challenges to overcome**
  - Focus on aspects that are easy to quantify,
  - Large numbers & different indicators for same themes :need to be clear on metrics definition,
  - Context specificity: relevance?
  - The risks of aggregation
- **EU-FADN : survey across MS's to collect annual structural and accountancy data**
  - Still a need for continuous monitoring: holdings' income and evaluation of CAP impacts
  - Need to interconnect economic, environmental and social sustainability: capital, resilience to shocks, externalities and public goods, climate change, generational renewal…

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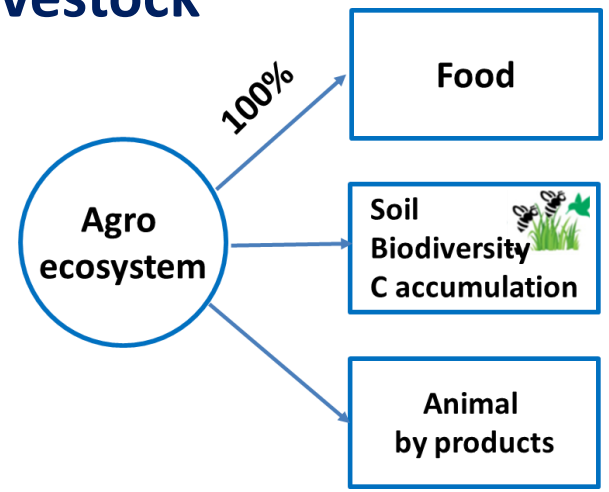
3. Some flaws of LCA to overcome

(Laurence Smith et al., Anders Herlin et al)

- **LCA does not consider the circularity of agro-ecosystems with livestock**
  - Do not capture a broad range of ecosystems services relevant to SDGs (biodiversity, soil C sequestration, soil fertility…)
  - Role of animal in circularity (recycling, use of no arable land)
  - Valorisation of animal products beyond meat, milk and eggs



- **LCA do not consider important social aspects**
  - Profitability, work quality, animal welfare, jobs…
- **Methodological choices**
  - Functional unit : kg v. nutrition v. ha, coproduction (milk & meat, mixed farming systems)
  - Metric to evaluate the real impact on CC: role of CH_4, soil cover albedo
  - Emissions saved for the other sectors thanks to circularity of livestock farming
- **Improving LCA of livestock systems**
  - Biodiversity, feed/food competition, Soil C sequestration, social issues

Pathways FOR SUSTAINABLE FOOD

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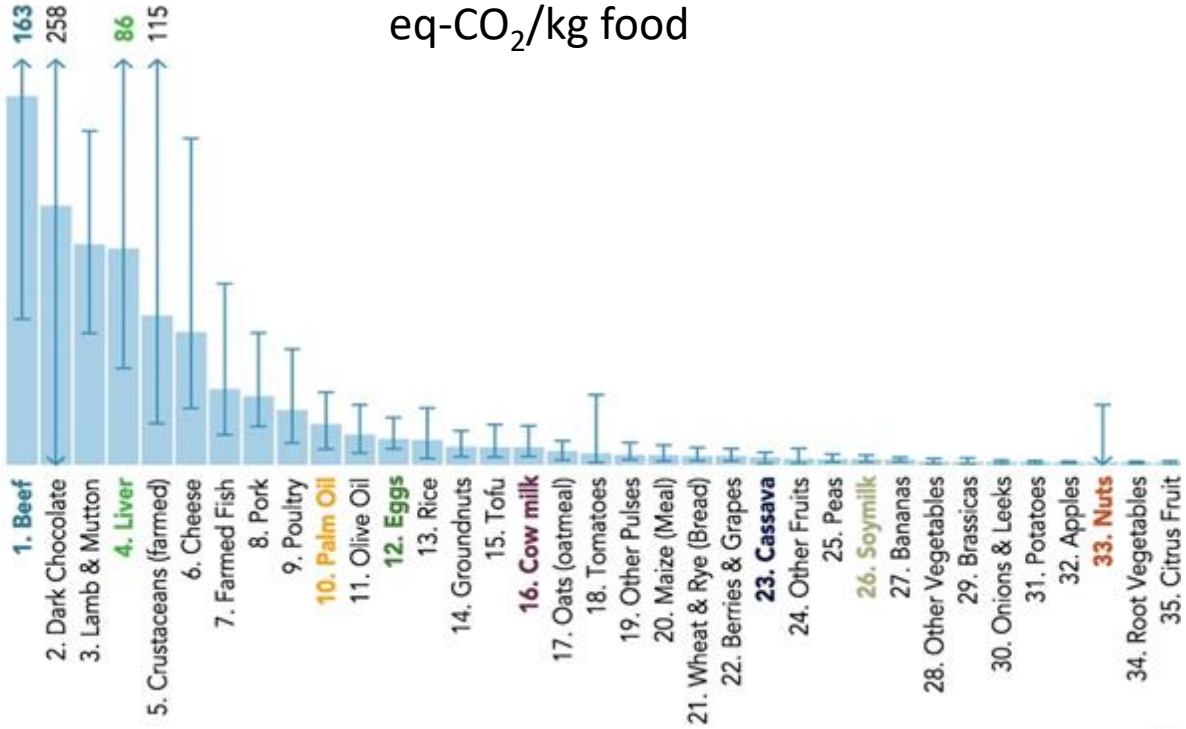
3. ASF for human nutrition

(L Merbold et al)

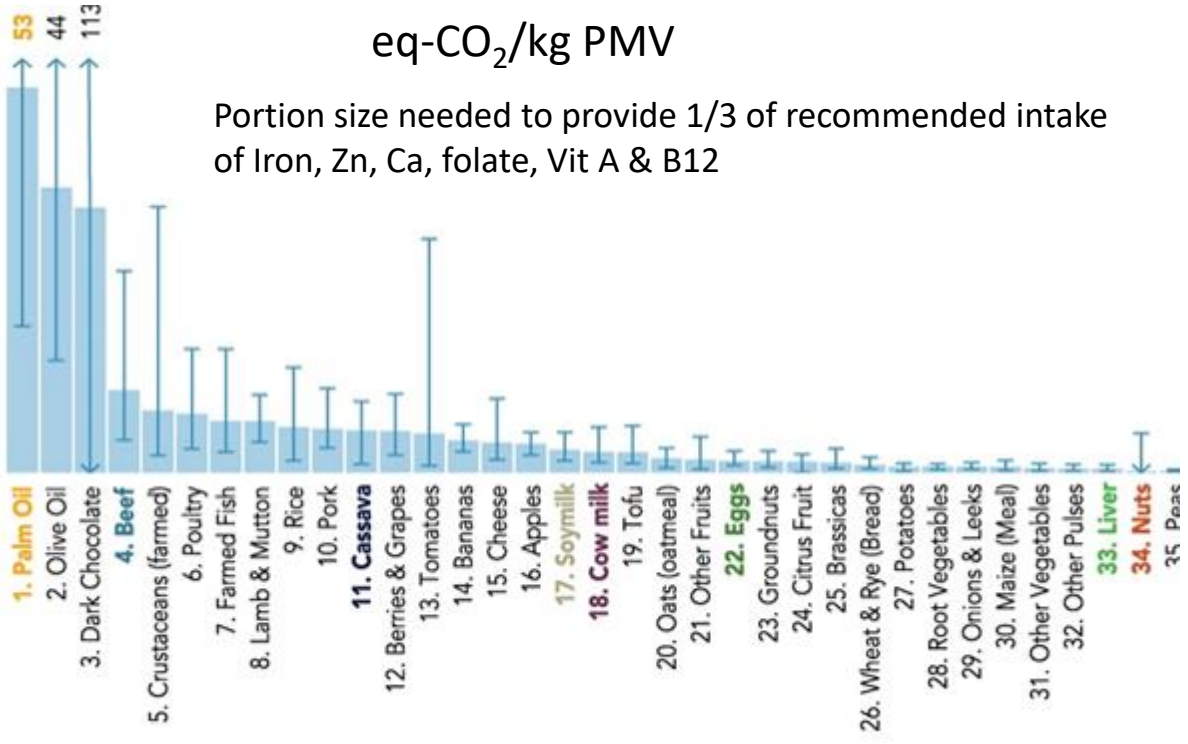
- **ASF are nutrient dense and provide a broad spectrum of nutrients**
  - Diets with low ASF : Deficiencies Vit B12, D, A, DHA-EPA, iron, zinc, iodine, calcium, Fractures, anemia, neurological disorders
- **Toward a nutritional functional unit to inform decision makers and consumers**

eq-CO_2/kg food



eq-CO_2/kg PMV

Portion size needed to provide 1/3 of recommended intake of Iron, Zn, Ca, folate, Vit A & B12



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Conclusion

- **A common definition of livestock sustainability**
  - What sustainable livestock systems are? (there is no ideal system!) in a context of food security
  - Considering the concept of Safe and Just Operating Space
- **Challenges for research**
  - Embrace the complexity of socio-technical systems (biological and social science-governance),
  - Recognize that there is not one way to reach a goal, but many ways,
  - Need to be clear on metrics, harmonisation of terminology, indicators sets and methods
  - Combining Efficiency x Circularity x Diversity,
  - Co construction of innovation: divergence in individual/collective & public/private interests,
  - Analyse trade-offs and synergies between different aspects of the system (win-win/compromises),
  - Consider global and local context (allow for context specificity),
  - Need to develop more accurate and holistic models/tools (LCA) to assess the multi-functionality of livestock agriculture and to track progress.