ESAAF

European Science Alliance
for Agriculture and Food

Strengthening Climate Resilience in European Livestock Systems

ESAAF Roundtable, 26 June 2026

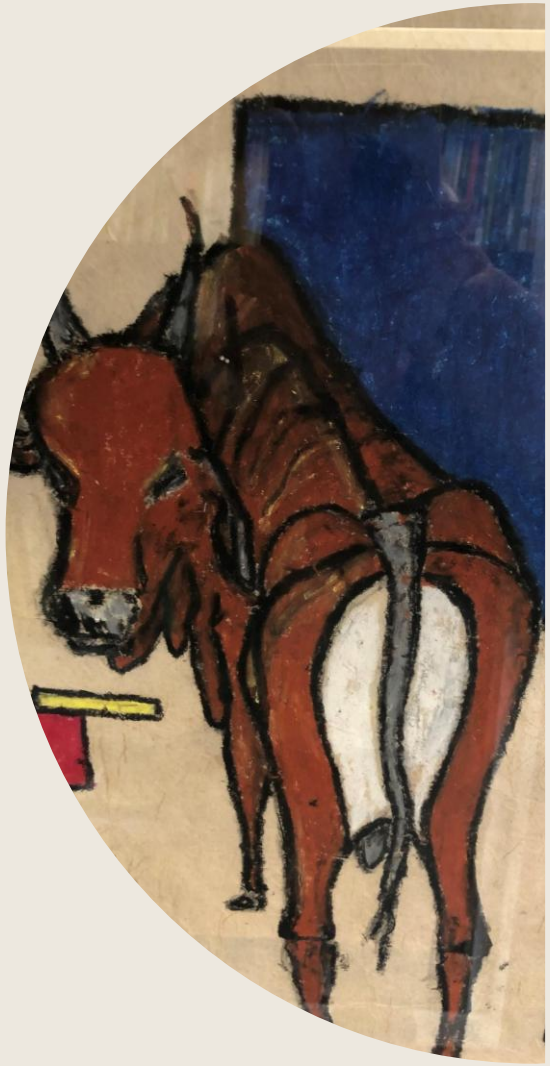
CSIC Office Brussels, Brussels

Circularity and climate resilient food systems

Circularity and climate resilient food systems

What is the role of livestock in the wider food system?

Simon Oosting Professor of Animal Production Systems
Wageningen University, The Netherlands



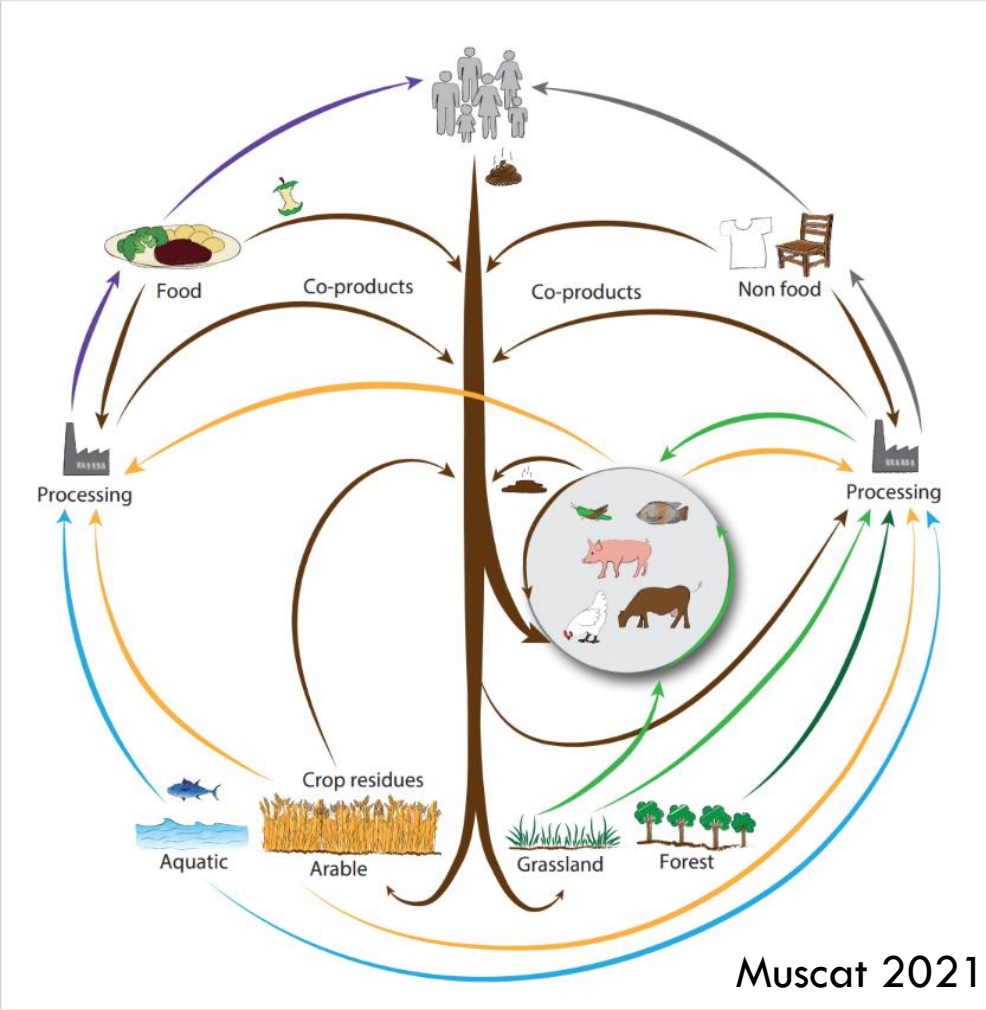
Why livestock and circularity?

In intensive regions:

- High export, high import, region is production site (economy)
- Regional harmful losses of nutrients to the environment

  (magnitude: similar to production)
- Regional loss of (bio)diversity
- Loss of landscape quality
- Drained peat soils: carbon loss
- Relatively low emissions per unit Animal-sourced Food

Circularity as an entry point for sustainability



- Avoid left-overs and wastes
- Use left-overs and wastes
- Spare land by avoiding feed-food competition
- Plant sourced biomass directly to humans ➔ crop land not for livestock
- Co-products and marginal lands ➔ livestock ➔ livestock waste converter

Consequences of circularity

Costs

- European Animal-sourced protein production and consumption to reduce considerably
- European Food system modelling: 25 – 40 gr Animal-sourced Protein per capita per day
- Present:
  - 60-120 gr Animal-sourced protein per capita per day
  - Export

Benefits

- More healthy diets
- Land sparing, biodiversity
- Less pollution
- Less greenhouse gas emissions (due to lower numbers, peat soils; higher emission intensity)
- Crop-livestock integration
- Dual-purpose breeds

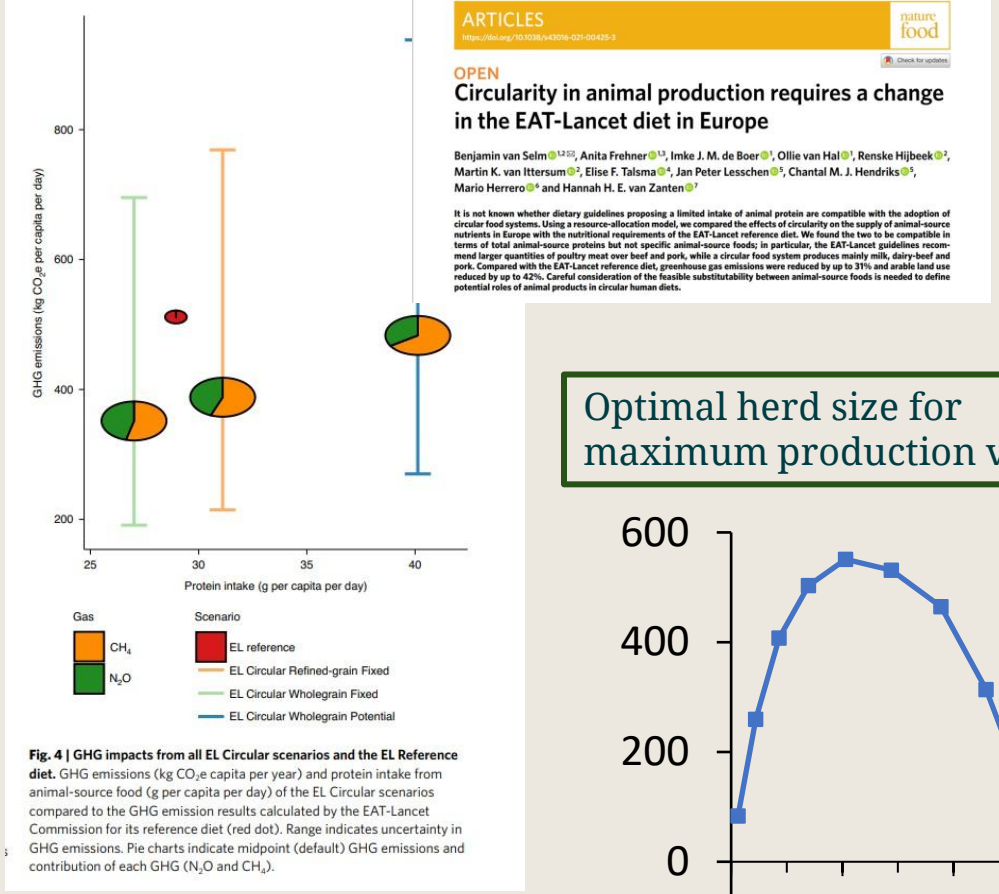
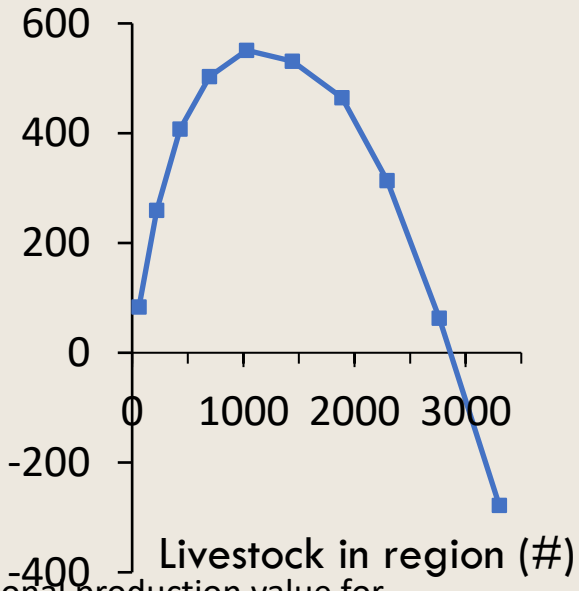


Fig. 4 | GHG impacts from all EL Circular scenarios and the EL Reference diet. GHG emissions (kg CO_2e capita per year) and protein intake from animal-source food (g per capita per day) of the EL Circular scenarios compared to the GHG emission results calculated by the EAT-Lancet Commission for its reference diet (red dot). Range indicates uncertainty in GHG emissions. Pie charts indicate midpoint (default) GHG emissions and contribution of each GHG (N_2O and CH_4).

Optimal herd size for maximum production value



Regional production value for milk

Policies: diversity in landscapes and farming systems

For zone A sustainable poultry farming system

- Maximal use of waste and by-products
- Locally produced energy and protein crops
- Excellent animal welfare
- Manure upgrading for use on crops
- Economically viable

➔ Circular, optimal food-feed competition, low climate impact, socially accepted

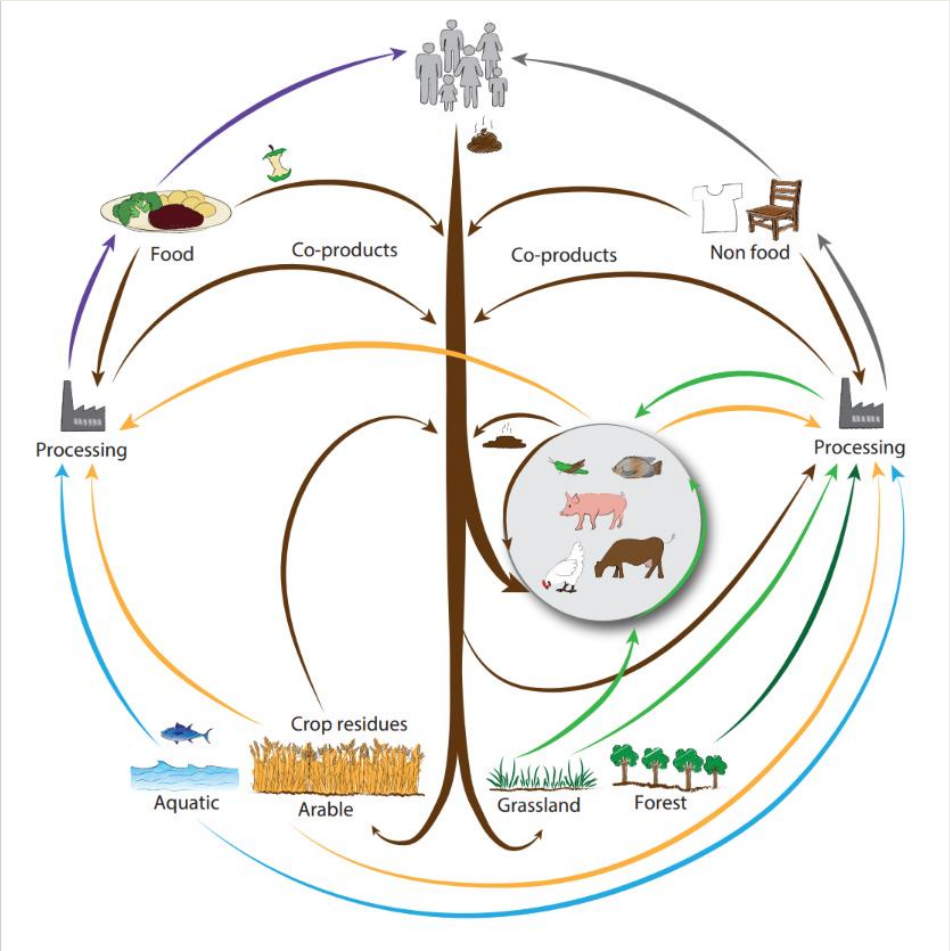
For zone B nature-inclusive grazing systems

- Biodiversity
- Social functions
- Carbon sequestration
- Health and welfare measures
- Optimal greenhouse gas emissions
- Economically viable

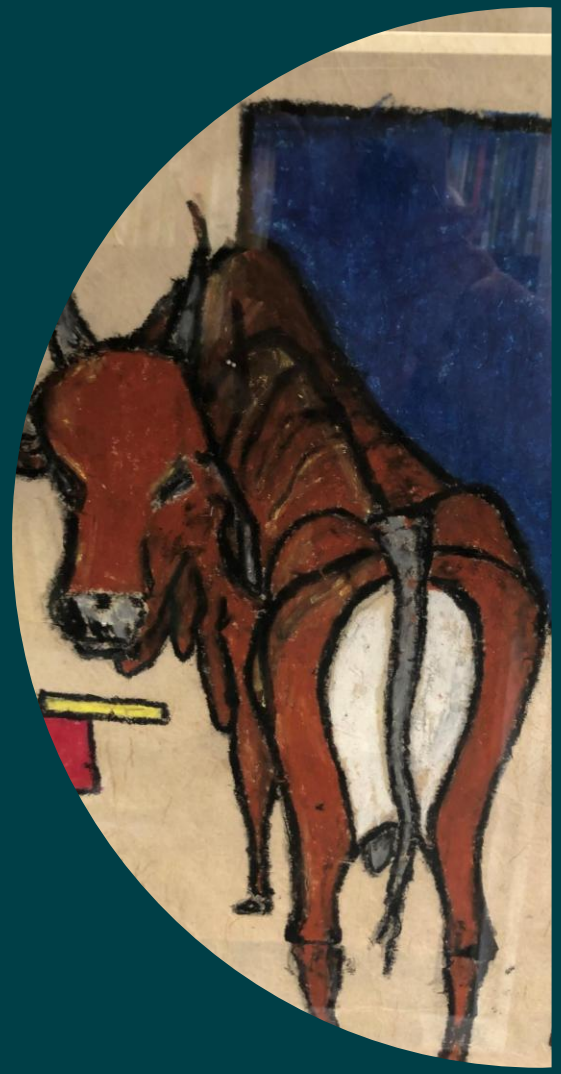
➔ Low impact, high social value, high biodiversity

Circularity is entry point to more sustainability, and the end point is a system change!

- New farm and value chain economy
- New consumption behaviour
- New diversity (landscape, farms, business models, breeds)



Thanks for your attention!

ESAAF

European Science Alliance
for Agriculture and Food