



Food and Agriculture Organization
of the United Nations

The role of livestock in circular bioeconomy systems

14th ATF Seminar - 20 November 2024

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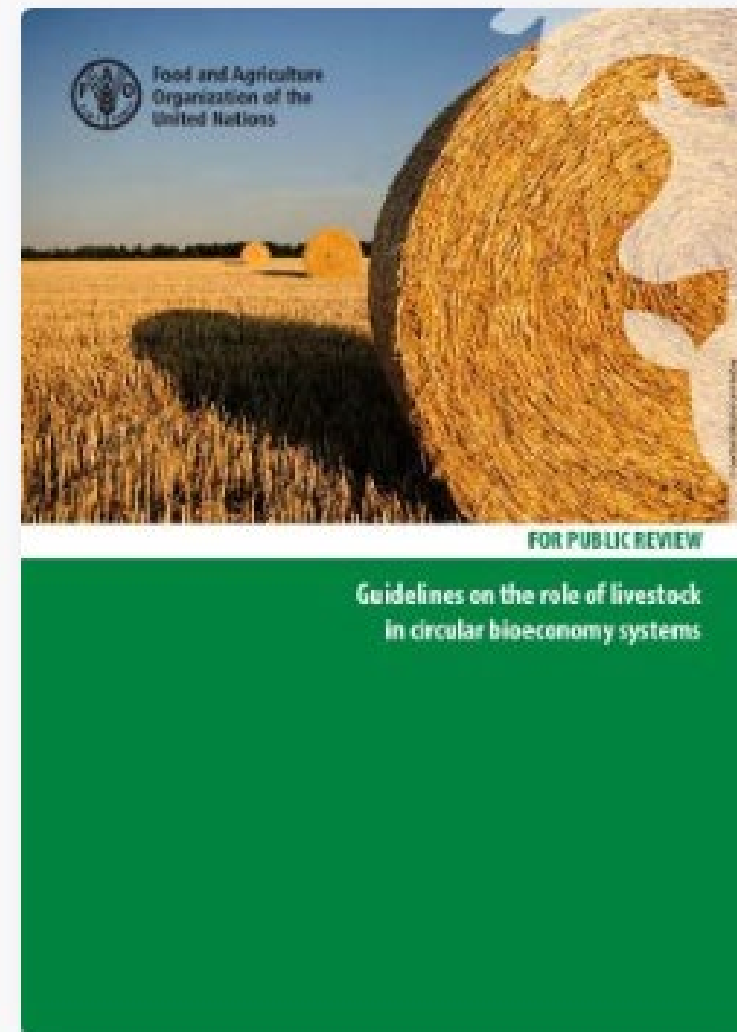




The role of livestock in circular bioeconomy systems (FAO LEAP Report)

In January 2023, the FAO LEAP Partnership initiated a new Technical Advisory Group (TAG) on “*Integrating Circular Bioeconomy Approaches in the Environmental Assessment of the Livestock Supply Chains*”.

The TAG will define methodologies and metrics to account for the Circular Bioeconomy approaches in the livestock sector and review the main emerging recovery options for livestock production residues and waste streams, as well as alternative feed resources. The TAG will finally develop technical guidelines on circular bioeconomy approaches in the environmental assessment of the livestock supply chains.





The role of livestock in circular bioeconomy systems (FAO LEAP Report)

- 3 TAG leaders



- Barbara Amon, Philippe Becquet, Tim Mc Allister
- 30 members from 25 countries
- <https://www.fao.org/partnerships/leap/news-and-events/news/detail/en/c/1633715/>





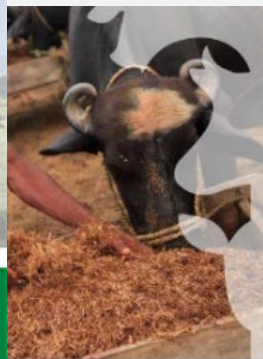
Circular bioeconomy approach guidelines in LEAP

The role of livestock in circular bioeconomy systems (FAO LEAP Report)



VERSION 1

Nutrient flows and associated
environmental impacts in
livestock supply chains
Guidelines for assessment



VERSION 1

Environmental performance of
animal feeds supply chains
Guidelines for assessment



VERSION 1

Water use in livestock production systems
and supply chains
Guidelines for assessment



VERSION 1

Environmental performance of
feed additives in livestock supply chains
Guidelines for assessment



VERSION 1

Environmental performance of
pig supply chains
Guidelines for assessment



Food and Agriculture
Organization of the
United Nations

Methane emissions in livestock
and rice systems
Sources, quantification, mitigation and metrics



BIODIVERSITY



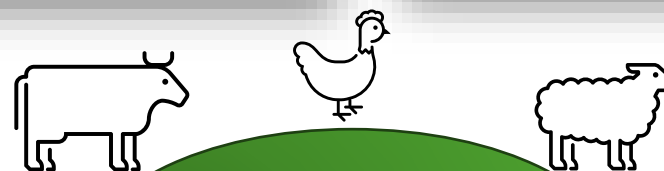
NUTRIENTS MODELLING



SOIL CARBON STOCK CHANGES



WATER FOOTPRINTING

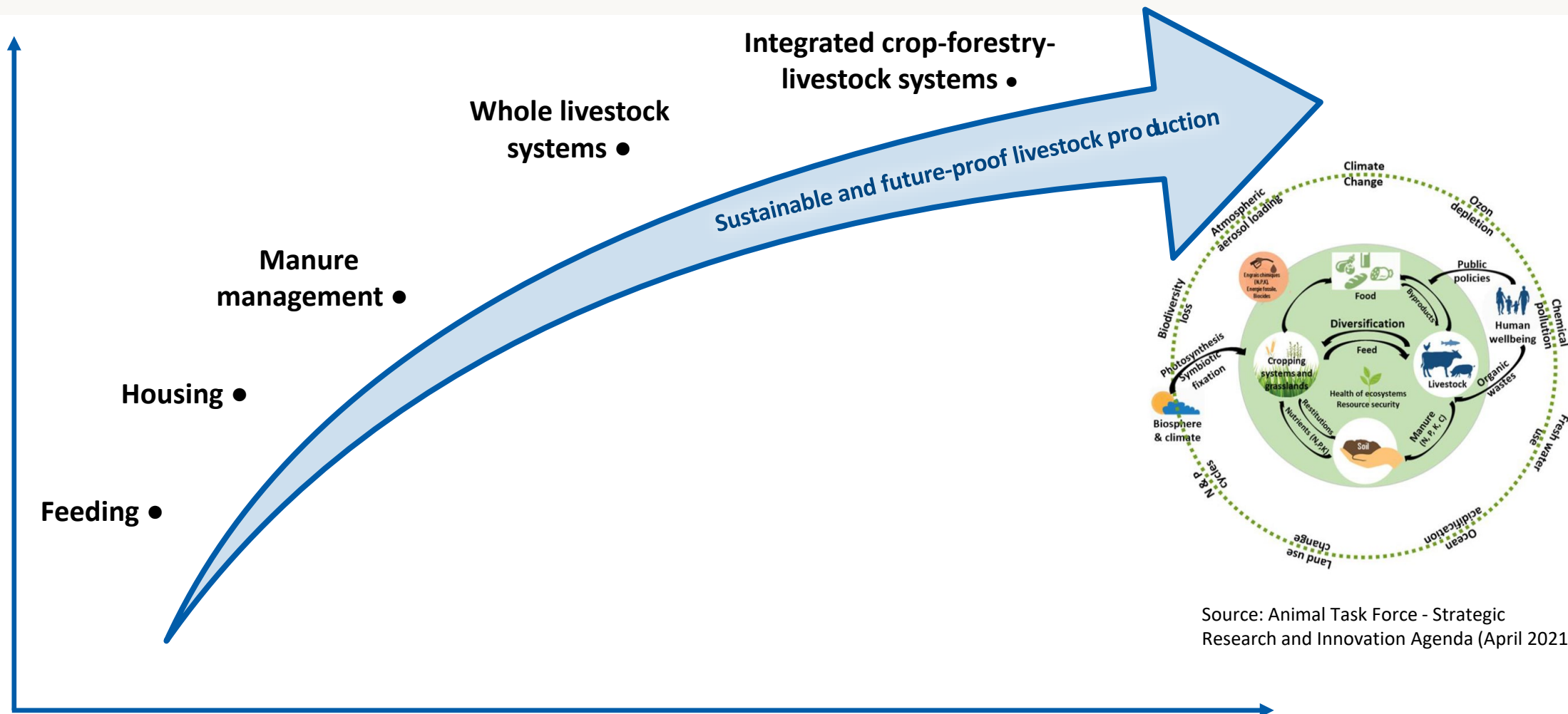


Circular
Bioeconomy
Approaches

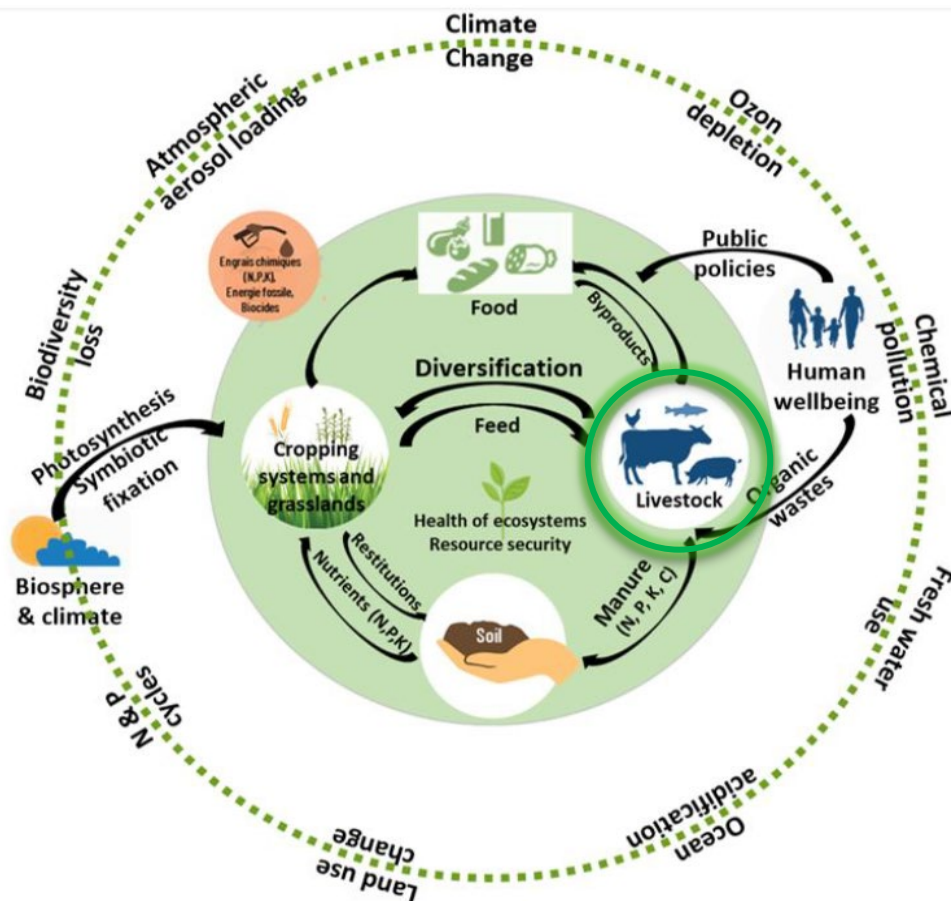
Circular
Bioeconomy
Approaches



The role of livestock in circular bioeconomy systems (FAO LEAP Report)



Livestock within the circular bioeconomy context



- Livestock: **recyclers** by nature (i.e. use of byproducts and inedible biomass)
- **Replace mineral fertilizers** by manure
- **Provide substantial Ecosystem services** (e.g. maintenance of grasslands, management of marginal areas, diversified cropping systems, agroforestry)
- These **benefits** can only be exploited, if we **transform livestock production** to become an **integrated part of circular bioeconomy systems**.



Livestock within the circular bioeconomy context – examples from a recent visit to Uruguay

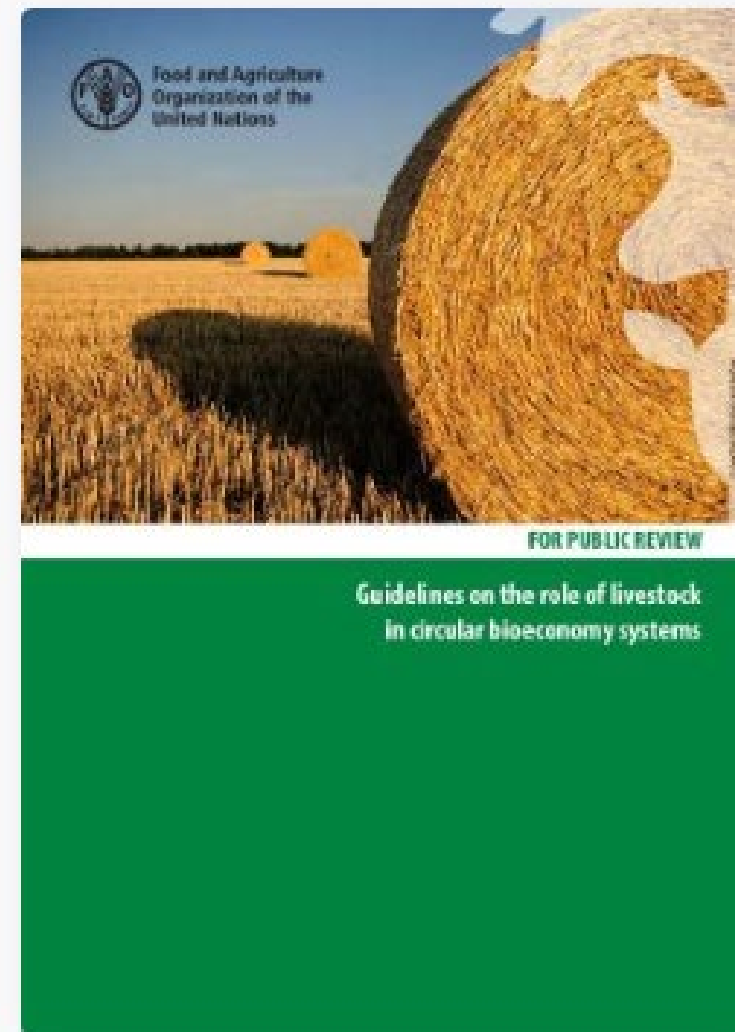




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Circularity indicators for Nutrient Use Efficiency

- ➡ Promoting the importance of circularity in livestock production
- ➡ Differentiating types of inputs and outputs

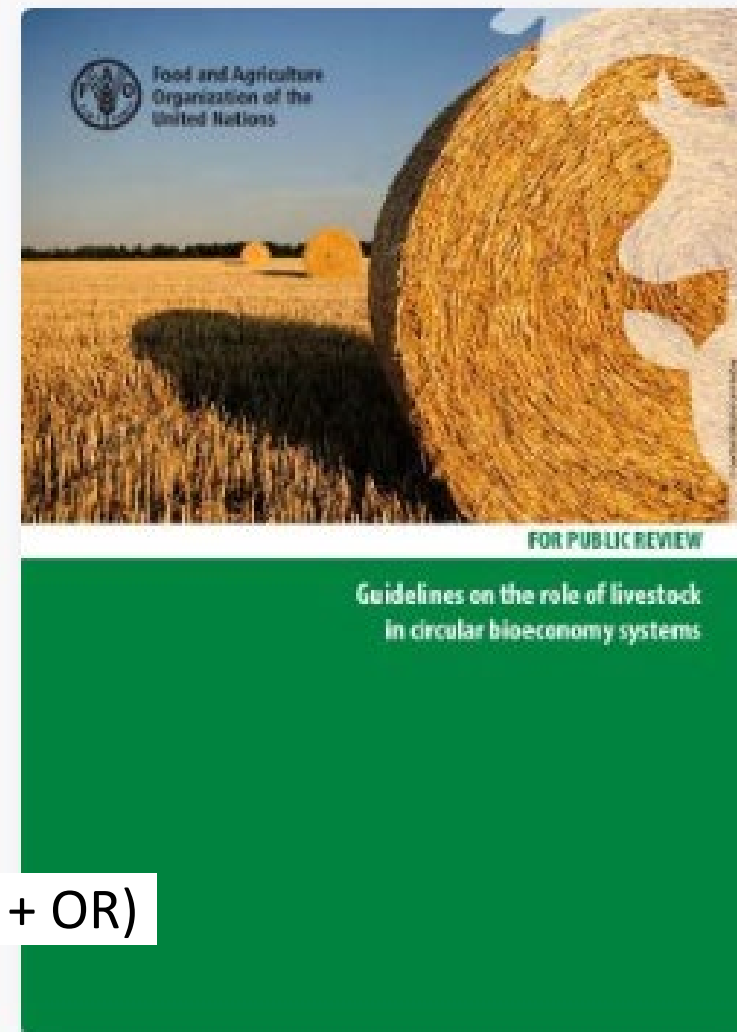
Partial Nutrient Balance (PNB) = Inputs (IN) – Outputs (ON)

Nutrient Use Efficiency (NUE) = $(ON/IN) * 100$

Nutrient Recycling Index (NRI) = $\text{Nutrient Recycled (NR)} / (\text{IN} + \text{NR})$




Input Circularity Indicator (ICirc) = $\text{IN Recycled (IR)} / \text{IN}$

Output Circularity Indicator (OCirc) = $\text{ON Recycled (OR)} / (\text{ON products} + \text{OR})$





Environmental Footprint

- Life Cycle Assessment
 - Attributional (allocation principle)  Insight on impacts
Hotspots
 - Consequential (system expansion)  Impact outcomes outside the
boundaries
- Food systems modelling and circularity  Total food chain impact



Plant Based Co-Products

- Residuals (Straw)
- Fermentation Co-Products (DDGS)
- Industrial Co-Products (Fruit pulps)
- Food loss and processing (Broken biscuits)

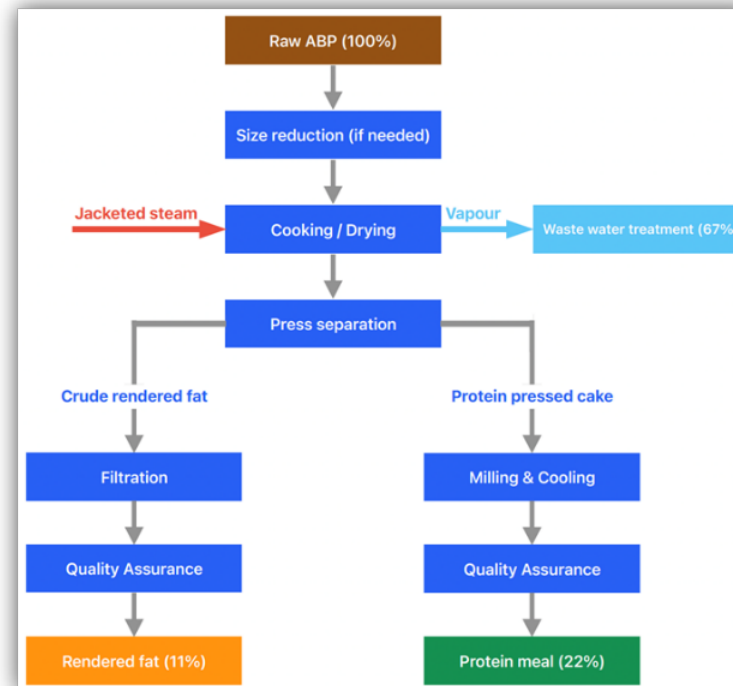


Food Safety (contaminants, hygiene)
Physical characteristics (liquid vs solid)
Nutritional value (ruminants, monogastric)
Registration systems



Animal Based Co-Products

- Livestock processing (Meat and Bone Meal)
- Milk processing (Whey)
- Hide and skin (Leather)
- Egg processing (Shell)



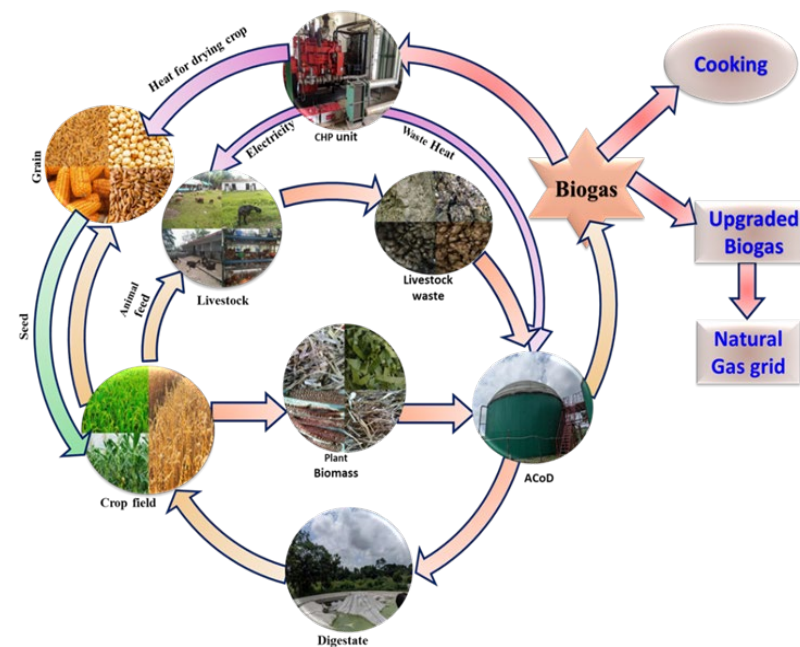
Food Safety (contaminants, hygiene)
Regulatory limitations (intra-species use,
prohibition ruminants)



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Manure

- Manure management (Storage)
- Field application (Fertilizer)
- Nutrient recovery (Phosphorus)
- Energy (Methanisation)

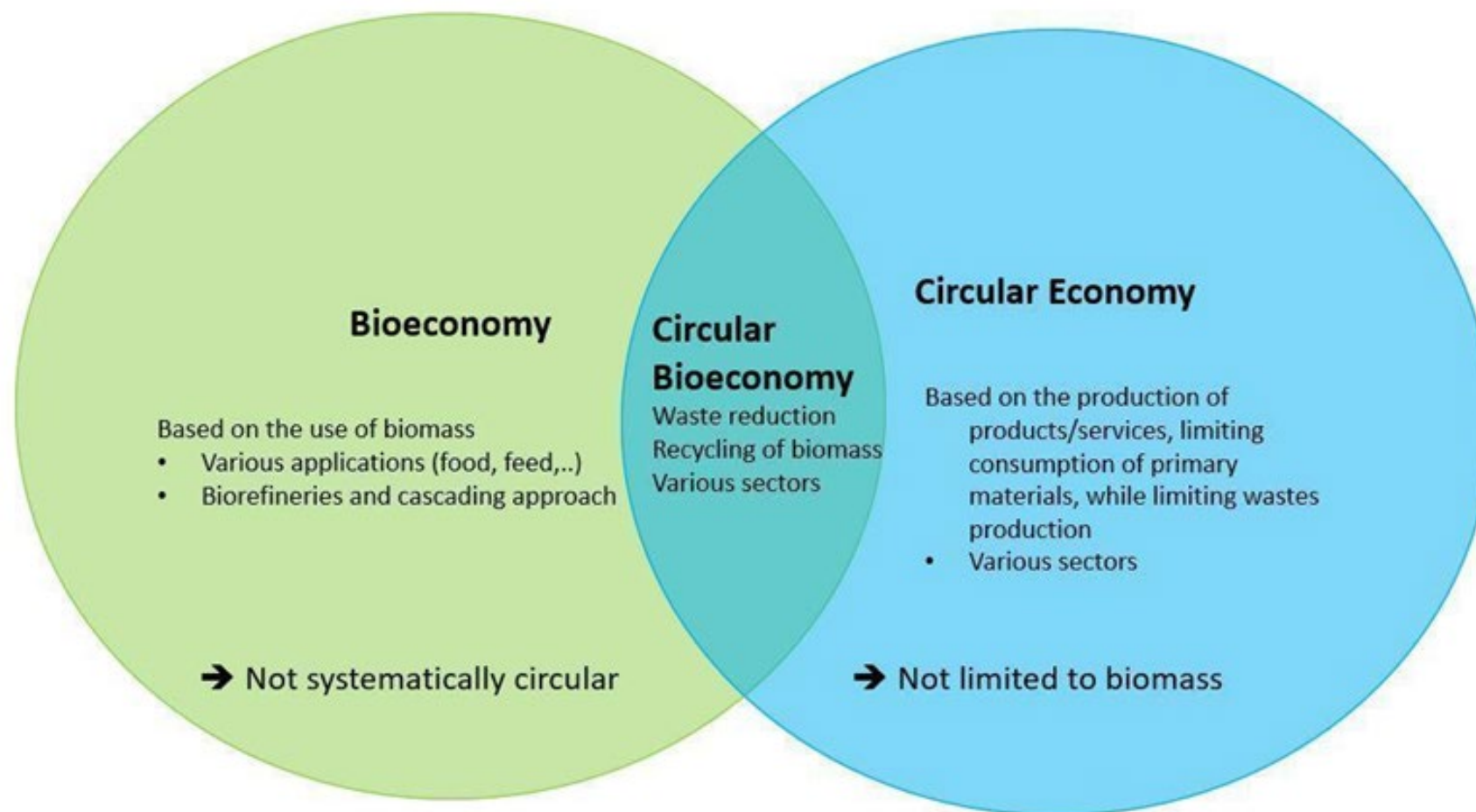


Food/Environment Safety (contaminants, hygiene)
Regulatory limitations (transport, field application)



Policies

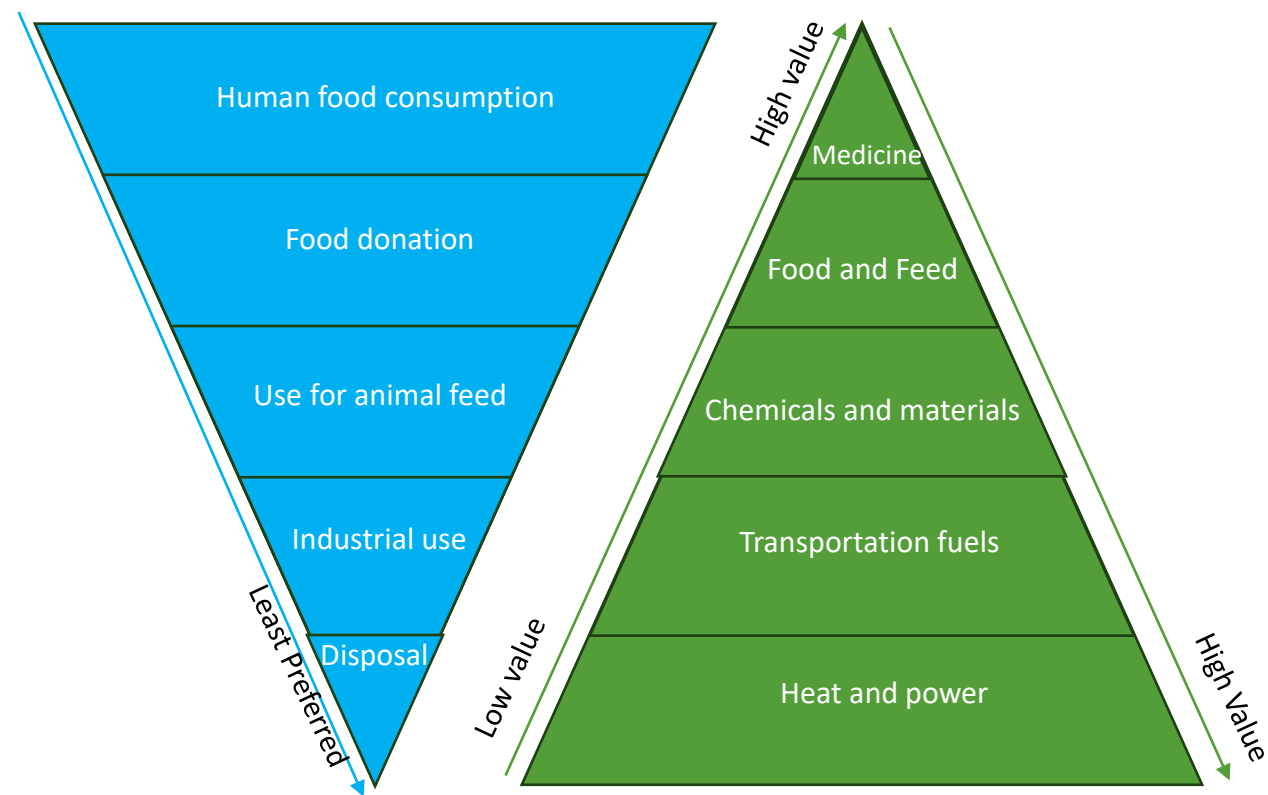
- Circular Economy
- Bioeconomy





Prioritization

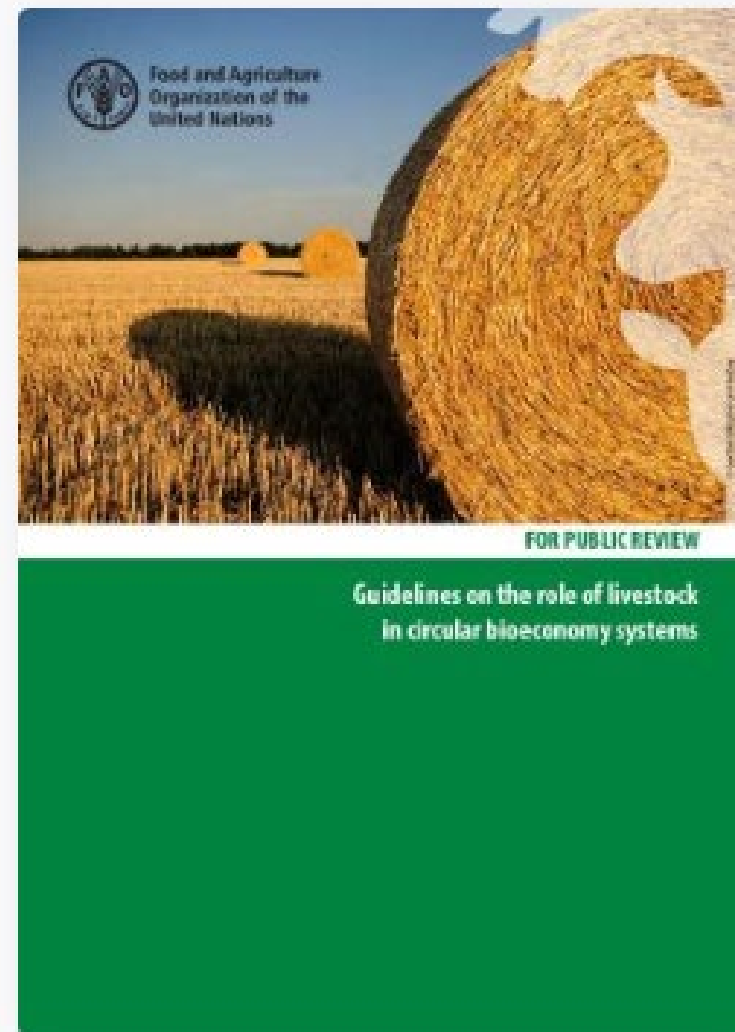
- Use of recycled biomass needs to be prioritized
- Utmost priority = Prevention
- First Priority = Food use





Next steps

- Second round of review comments received
- Revision of the Guidelines following the review suggestions
- Final version by the end of 2024
- Launch of the Guidelines beginning of 2025





Thanks to all the Contributors to the Guidelines

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