



# Livestock perspectives in food systems

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'Sustainable animal agriculture for a sustainable tomorrow'

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**ILRI**  
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# Overview

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- Food systems
- Livestock and food systems
- Context of demand and where food is being produced
- Opportunities and examples



# Food systems



# Food systems transformation: a new lens



**Food Systems Summit 2021**



# Challenges!

- Hungry people – about 735 million
- Food insecure people – 2.4 billion – almost one third of humanity
- People unable to afford a healthy diet (one that includes milk, meat and eggs) – 3 billion
- Stunted children – 148 million



# Livestock and food systems



# Why does a food systems perspective matter for livestock?

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- Food systems transformation lens essential to make progress towards SDGs

*'.....transforming agrifood systems to increase their efficiency, inclusiveness, resilience, and sustainability is an essential comprehensive design for realizing the 2030 Agenda for Sustainable Development.....'*

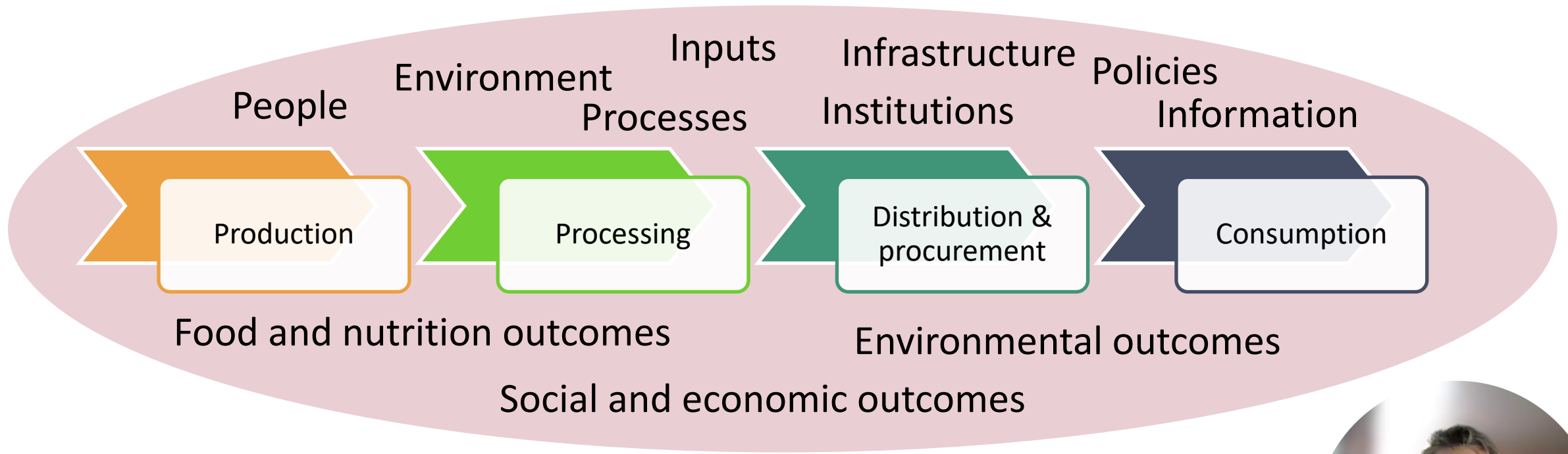
FAO. 2023. The State of Food and Agriculture 2023

- We are off track
- Livestock make essential contributions to multiple development aspects
- We need to be prepared and responsive to 'unexpected drivers'

*Sustainable animal agriculture for a sustainable tomorrow necessitates a food systems lens*



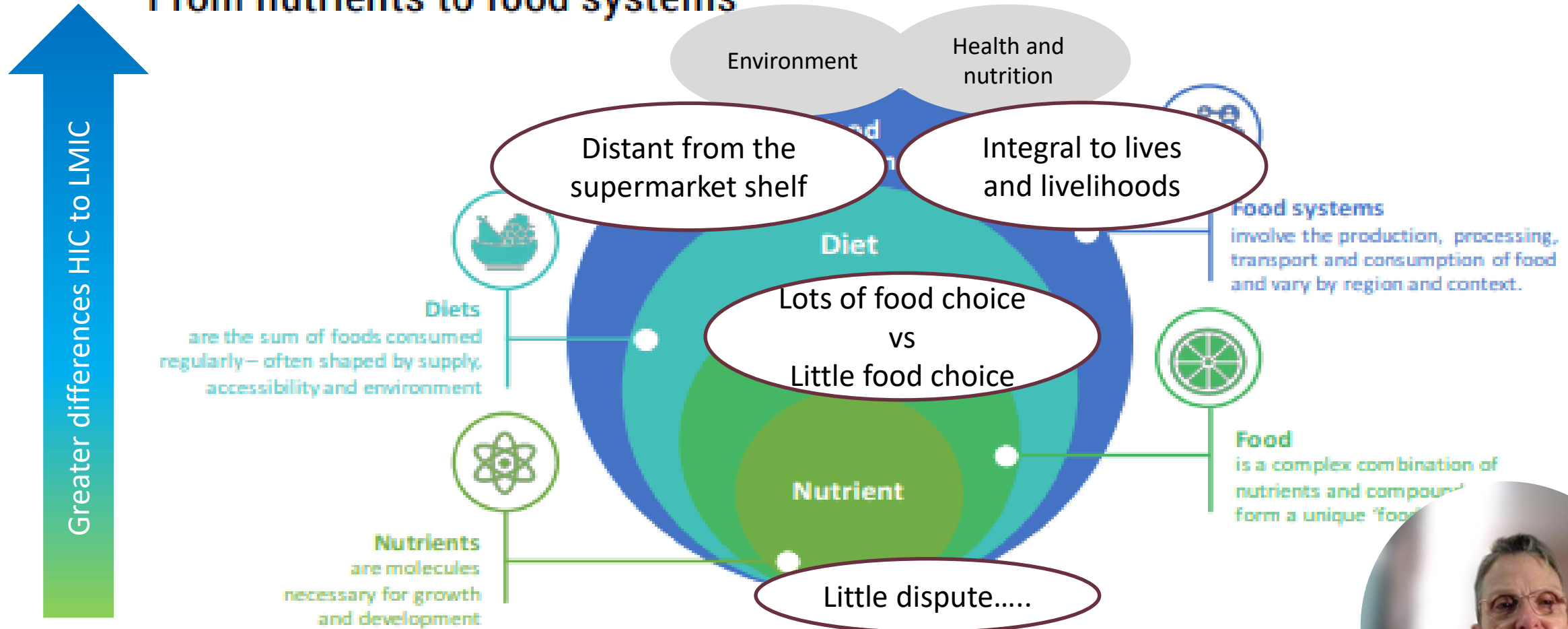
# Livestock and food systems





# Livestock derived foods and food systems

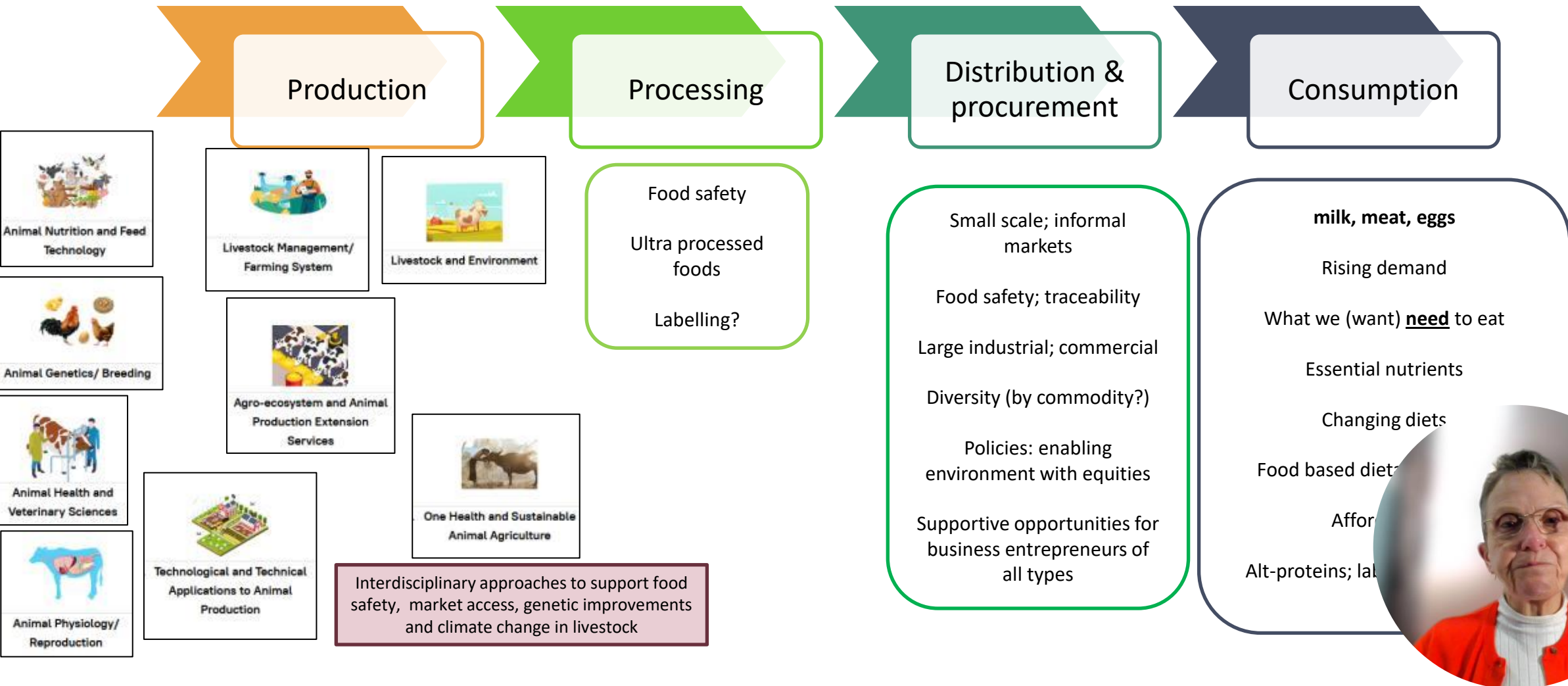
## Figure 5. From nutrients to food systems



Source: Modified from Cartmill, Iannotti, 2020; republished in UN Nutrition Discussion Paper (2021) Livestock-derived foods and sustainable healthy diets.



# Livestock and food systems



# Context



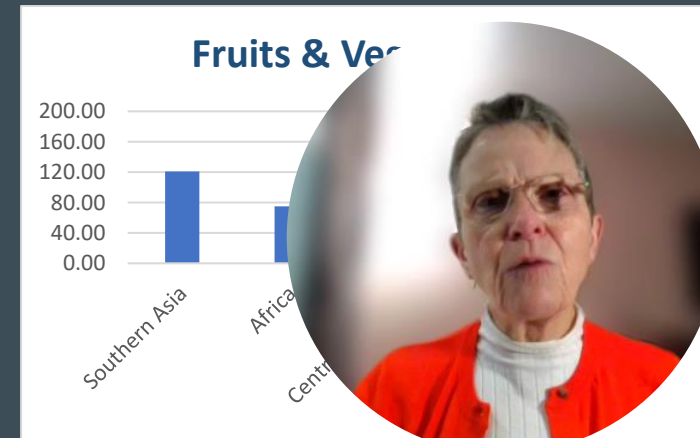
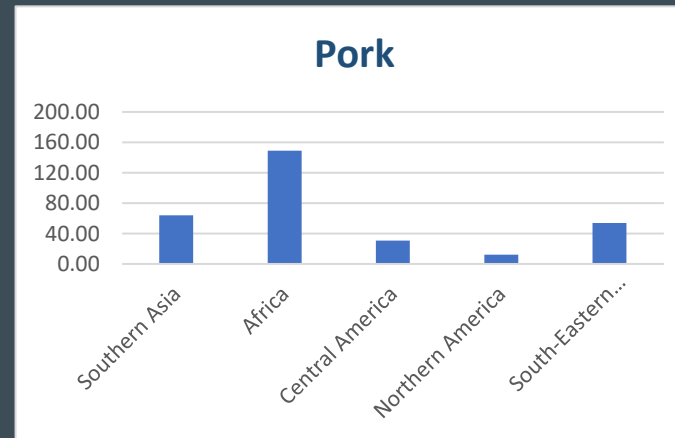
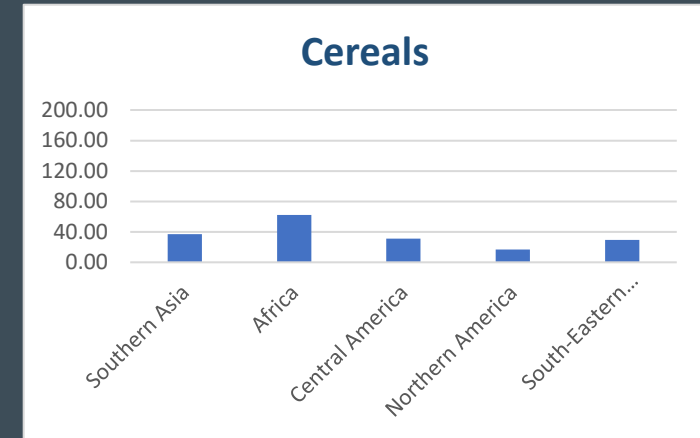
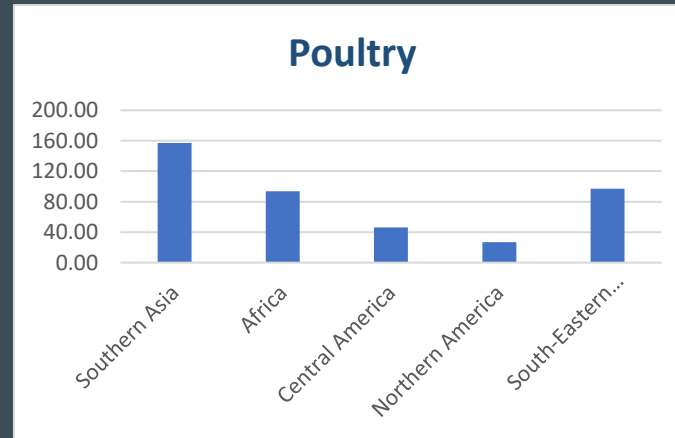
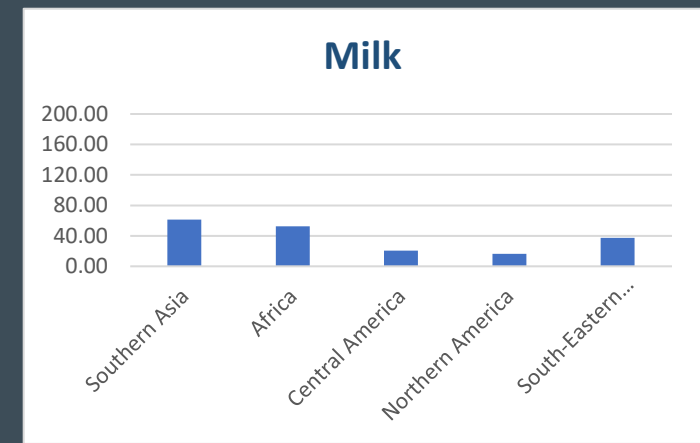
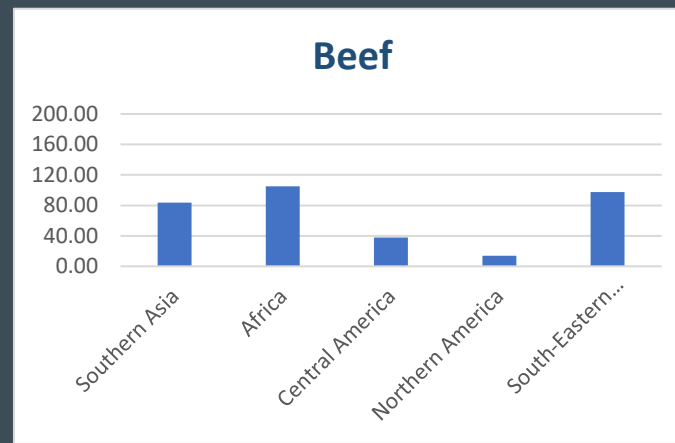
# Demand for food will keep growing

*Especially in LMICs*

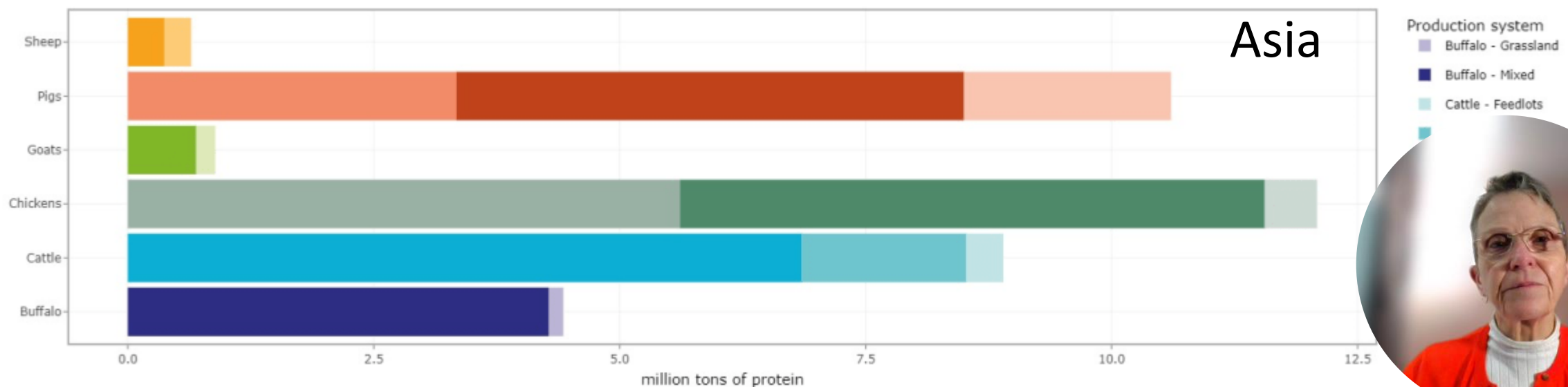
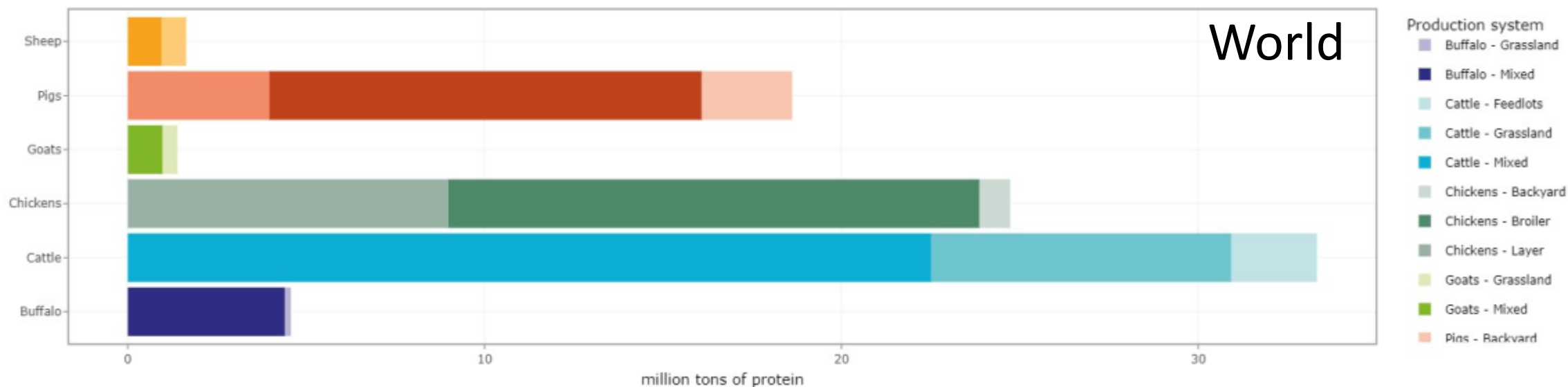
- Demand for milk, meat, eggs is increasing fastest in LMICs driven by population, rising incomes and urbanization
- Not based on significant over-consumption in LMICs (attention: 'double burden')
- 70% of livestock-derived foods consumed in LMICs are **sourced in informal markets**

## Percentage changes in demand 2010 to 2030

Projections based on IMPACT model, Dolapo Enahoro (ILRI)



# Production of protein from animals



## Smallholder farmers currently provide most of the meat, milk and eggs AND staple cereals in LMICs

- **1.7 billion people** derive some livelihood from livestock; over half a billion depend on livestock
- **Livestock are fundamental** to many economies; provide income, jobs, and supporting risk mitigation
- Livestock are the basis for **farm sustainability**, integrated livestock-food farms make food crop farming even possible for many in the Global South – circular bioeconomy in action!



### Farms of less than 20 hectares provide:

Nearly 50% of the world's livestock and cereals, and close to 70% of the livestock and cereals in emerging and developing economies

### Did you know

Livestock are a key part of the bioeconomy and provide most livestock products



# Opportunities and examples





### Livestock based food systems transformation research

- ✓ Improved productivity - better feeding, health and genetics and their **integration**
- ✓ Development of effective input and output markets; supportive policies and investments.
- ✓ Mainstreaming gender into research programs; identifying entry points for livestock
- ✓ Apply a One Health for research on zoonotic diseases, food safety and AMR
- ✓ Increasing accessibility of animal source foods to improve nutrition and health outcomes
- ✓ Supporting food systems transformation at country level

### Livestock based climate smart research

- ✓ GHG mitigation options – emissions intensity; manure management; landscape level C- sources and sinks
- ✓ Accurate figures to support NDCs; support NAPs
- ✓ Adaptation options and monitoring
- ✓ Genetic selection:
  - ✓ Climate resilient forages and animals
  - ✓ Animals with lower methane emissions
  - ✓ Forages with anti-methanogenic properties

For livestock climate mitigation and adaptation options are often syn

NDCs: Nationally Determined Contributions  
NAPs: National Adaptation Plans





# Sustainable Animal Productivity for Livelihoods, Nutrition and Gender inclusion (SAPLING) <sup>17</sup>



**Transformation of livestock-based food systems to meet demand must also incorporate positive transitions for the environment, livelihoods, equity.....**

- Bundling technological solutions (and bringing many new ones) for greater productivity with reduced environmental footprint, improved animal welfare
- Local supply chains must be professionalized, supported by enabling policies



# Purpose

To co-develop research with and build capacities of different stakeholders to adapt livestock production systems (LPS) to climate change whilst reducing emissions and optimizing environmental gains



Strengthen capacities of LP households to adapt to CC in socially inclusive way



Improve provision of information services to reduce climate-related risk



Strengthen capacities of LP systems at scale to adapt to CC in socially inclusive way



Catalyze investments for the transition to low-emission sustainable LVCs



Build capacities of policymakers to support climate change adaptation and mitigation



More-informed and evidence-based decisions by LPS stakeholders on adaptation to climate change supported by improved tools, technologies, skills and policies



# One Health

Integral to improving food and nutrition security

## FOOD SAFETY

Opportunities to provide enabling regulatory environments, training, simple technologies and incentives to adopt food safety practices

### ➔ Did you know...

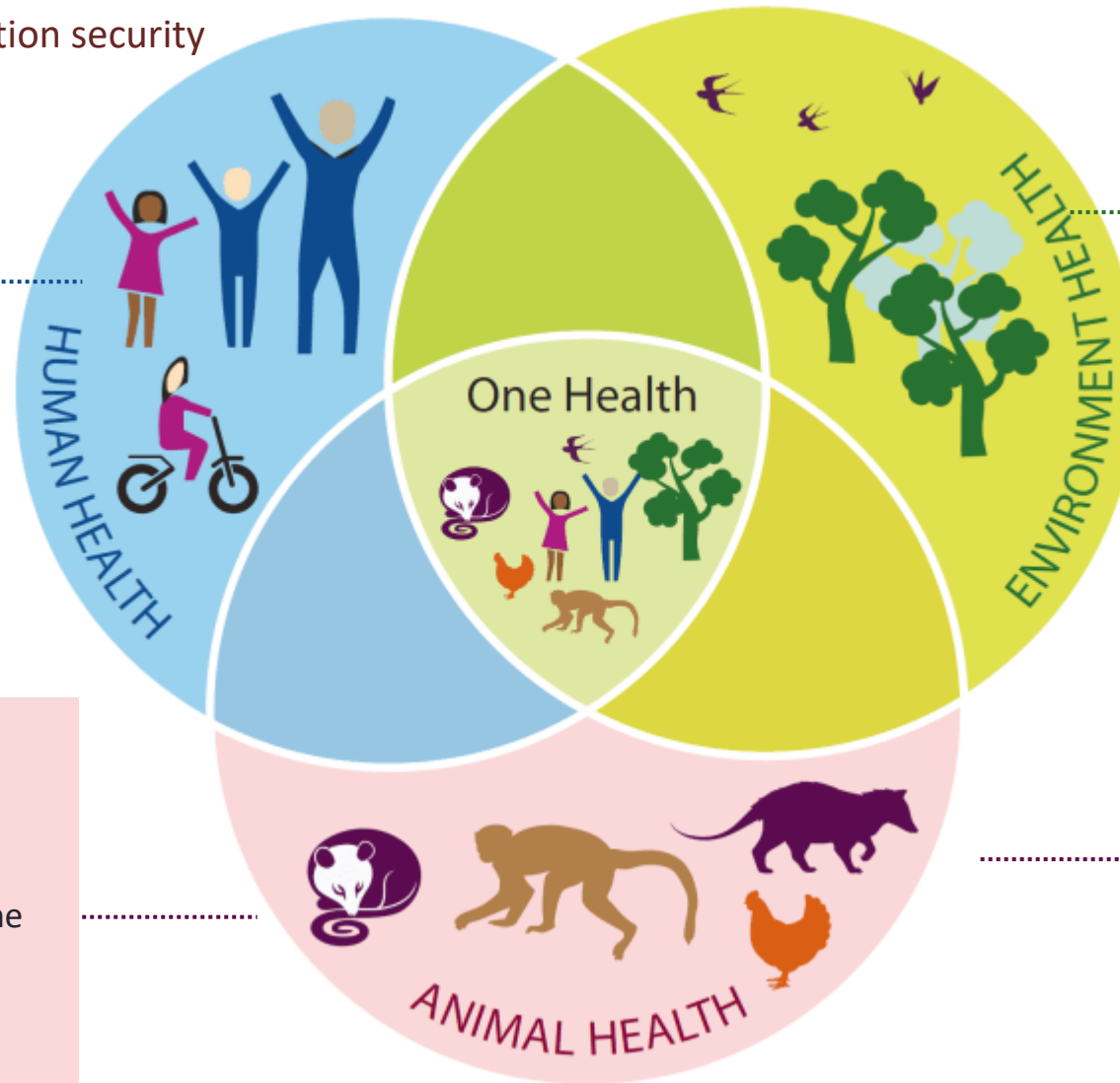
Foodborne illnesses cost LMICs up to **USD 110 bln** annually!

## ANTI-MICROBIAL RESISTANCE

Develop integrated approaches to understand the opportunities for mitigation without jeopardizing livelihoods and production

### ➔ Did you know...

AMR estimated to **cause 1.2 M fatalities** annually, most in LMIC



## RESPONSE THROUGH...

Institutional coordination and action at every level for animal, human and environment health

## PANDEMIC PREVENTION

Surveillance, and response at animal level



# Vietnam, Cambodia and Laos: Research to impact – One Health & Food safety

## SafePORK Vietnam & Safe Food Fair Food Cambodia:

- Food safety challenges in modern and traditional retail
- Low-cost interventions can make traditional retail safer



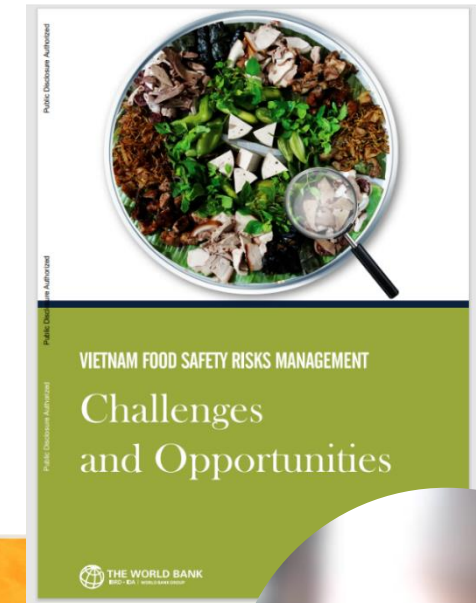
Taking up by larger initiatives

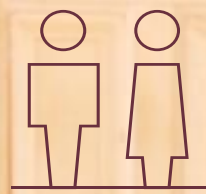
## Vietnam, Cambodia and Laos

- Risk assessment and communication capacity building

## Related impact pathways (Vietnam)

- WB funded Food Safety management report
- National Action Plan (NAP) for Food System Transformation
- One Health Partnership (Food Safety WG integrated here)
- WHO – Guidelines for traditional markets in Asia
- Operational One Health field sites



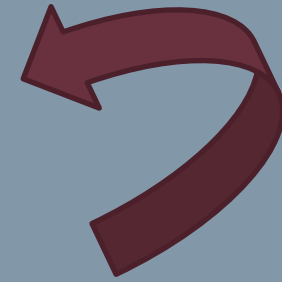


GENDER



Women's empowerment  
for livestock

Livestock for  
women's empowerment



### The Women's Empowerment in Livestock Index (WELI)

#### QUALITATIVE COMPONENT

- Explore local meanings of empowerment
- Study mechanisms of change in empowerment

#### QUANTITATIVE COMPONENT

- Construct an index: i.e. quantify empowerment
- Test quantifiable relationships livestock/empowerment



# NUTRITION: Livestock research addresses child stunting

Vaccinating rural poultry flocks against Newcastle disease and supporting animal health technicians to deliver the vaccines:

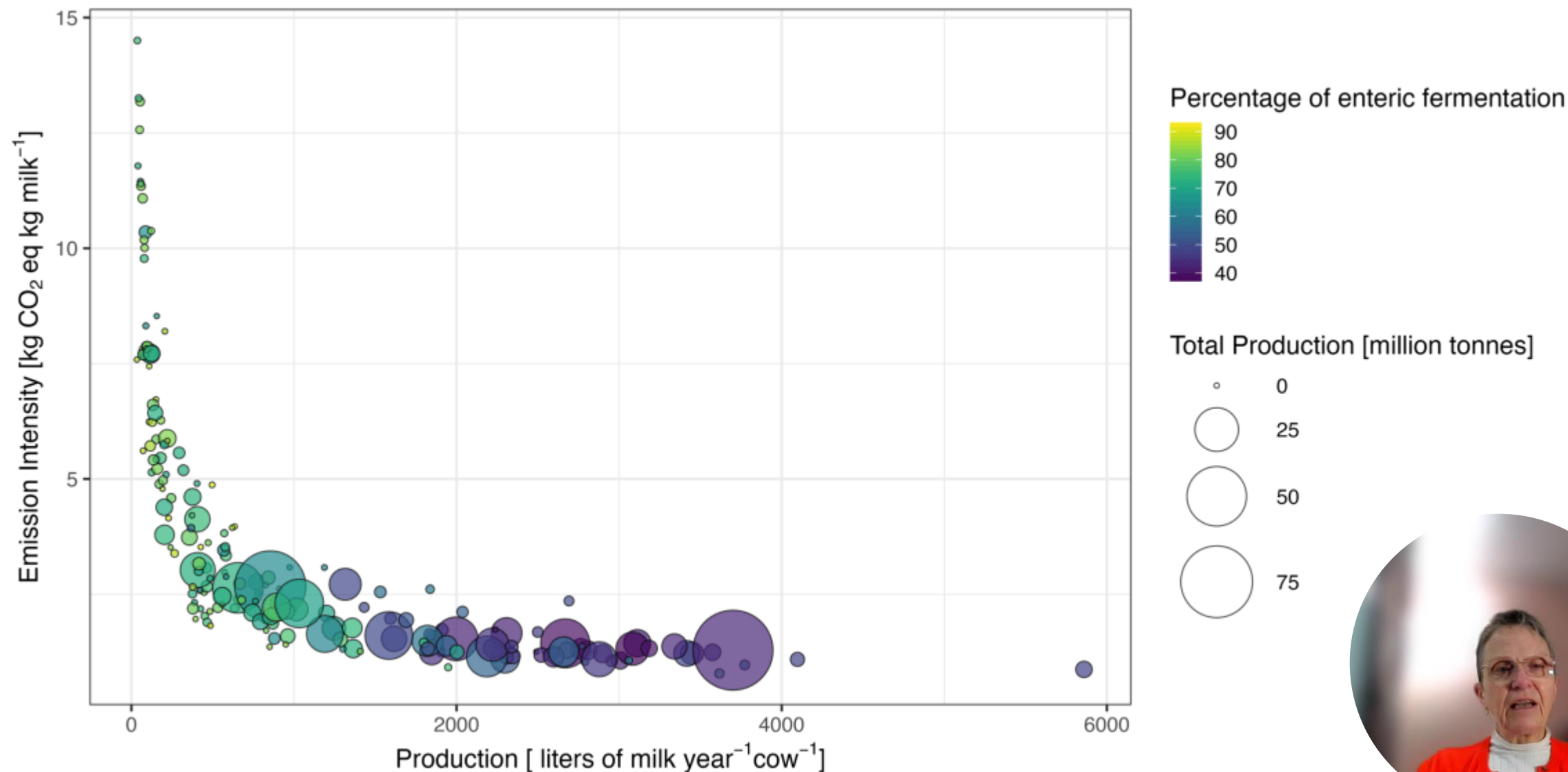
- enhances poultry productivity
- enhances household well-being
- significantly reduces stunting of both girls and boys



Otiang, E. et al., 2022:

<https://doi.org/10.1073/pnas.2122389119>

# Ruminant livestock and climate opportunity!

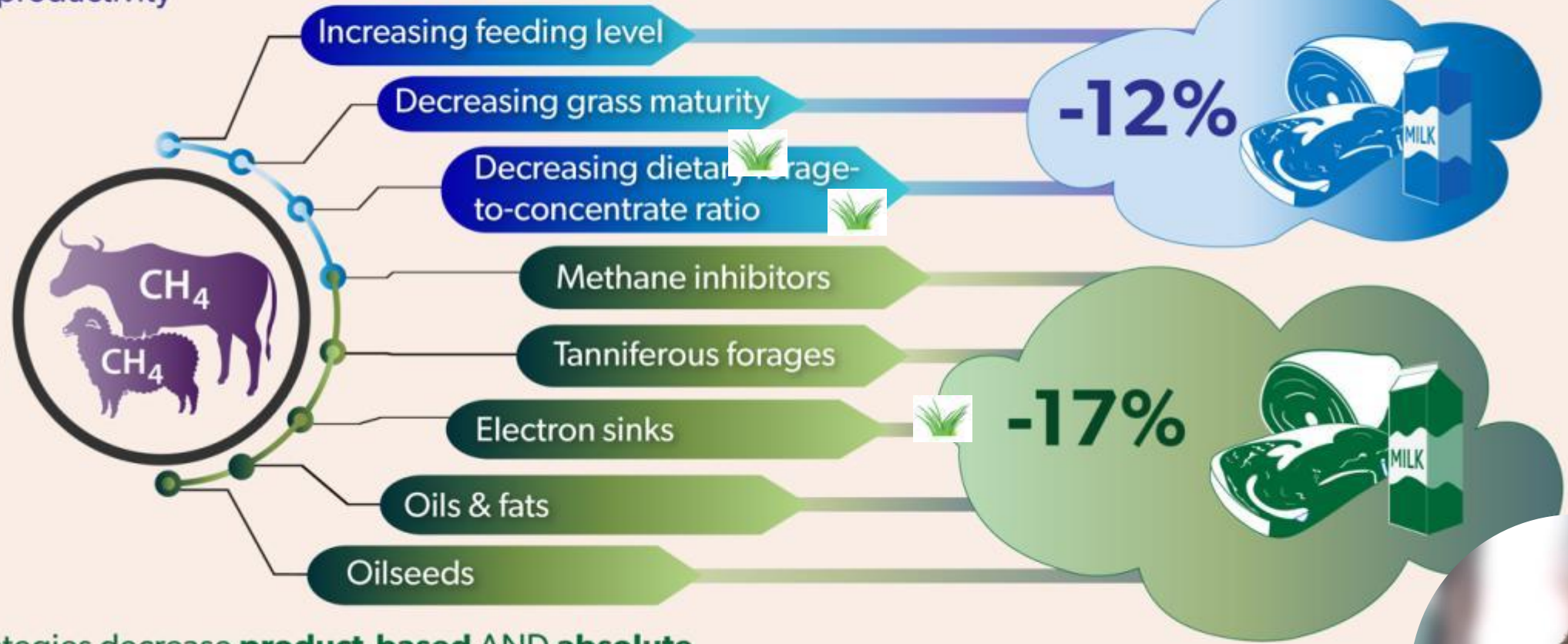


# There are effective ways to reduce enteric methane (CH<sub>4</sub>) emissions

...3 strategies decrease CH<sub>4</sub> **product-based emissions** (methane emissions per unit of meat or milk) while increasing animal productivity

They reduce product-based emissions, by an average of:

Out of 98 mitigation strategies...



...5 strategies decrease **product-based AND absolute emissions** (daily emissions) while maintaining animal productivity

To achieve maximum efficacy, barrier adoption must be identified and removed





## CLIMATE: Research on emissions from livestock -Mazingira Center, ILRI Nairobi.

- **Baseline data** on enteric methane emissions from tropical ruminants fed on tropical diets kept under tropical conditions (e.g. dry seasons and restricted intakes)
- **Measurement on interventions that increase animal productivity** and thereby **decrease emission intensities** (g methane per kg animal-source product).



# LAND: Livestock research addresses feed challenges

The straw and stover by-products of crop production make up more than half of livestock feed resources in lower income countries

Research on cereal, legume and tuber crops shows that genetic variation in their livestock feed traits can be exploited to increase livestock productivity by 15–25% with little to no trade-offs in grain yields

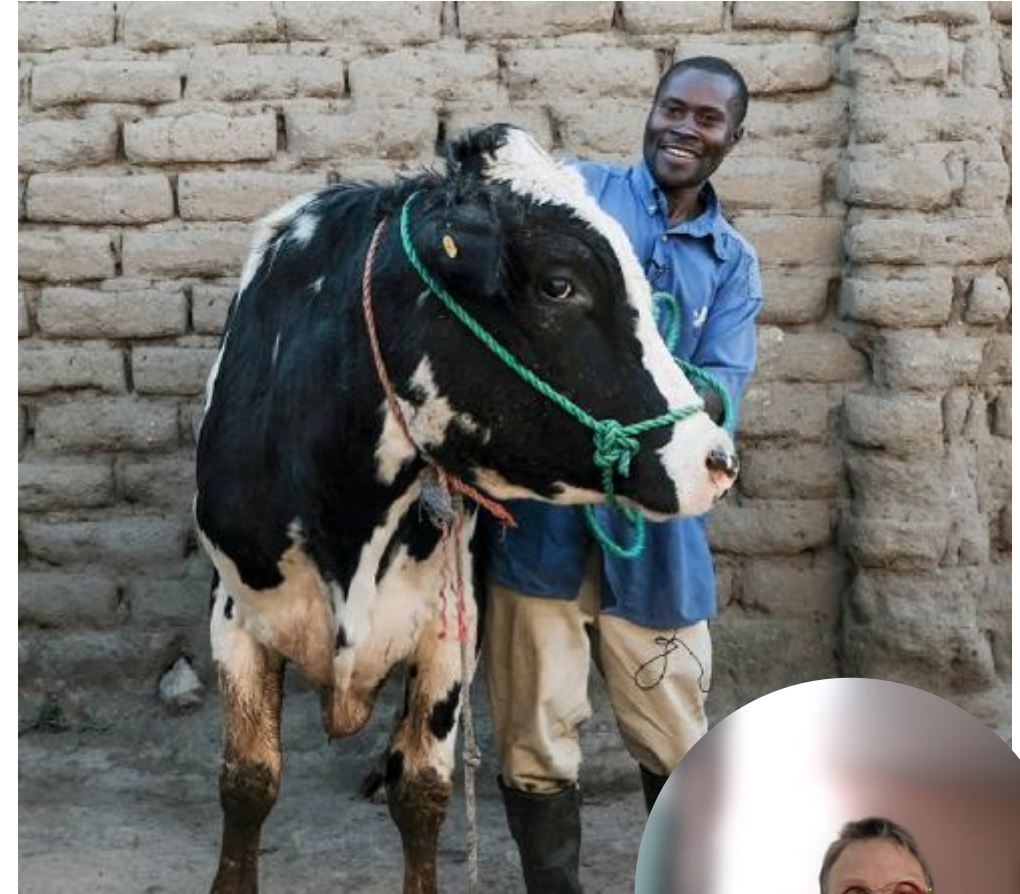
Superior 'dual-purpose' (feed as well as food) crops are now being bred to make their residues more nourishing for cattle, goats and sheep



Blümmel, M et al. 2020. Recent advances in dual-purpose rice and wheat research: A synthesis. *Field Crops Research*, 253, 107823 <https://hdl.handle.net/10568/108077>

## CLIMATE: Livestock research addresses the genetics of heat tolerance

- Milk yields decline when cows are under heat stress, and heat stress is rising under climate change
- Evidence of genetic variations among bulls makes possible improved breeding programs that select 'climate-tolerant' animals that maintain good milk yields under heat stress while reducing their greenhouse gas intensity



# LAND: Livestock research addresses rangeland management

Participatory rangeland management and participatory grazing planning with local communities is helping to rehabilitate rangeland ecosystems, to secure land tenure and to increase the resilience of pastoralist communities



Waweru, T. et al. 2021. Independent impact assessment report: Participatory Rangeland Management (PRM) in Kenya and Tanzania. Nairobi, Kenya: African Research and Economic Development Consultants Limited.




Sustainable animal agriculture for a sustainable tomorrow necessitates a food systems lens

Thank you!

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